

Supplemental Groundwater Investigation Operable Unit 1, Site 78 Marine Corps Installations East-Marine Corps Base Camp Leieune North Carolina

PREPARED FOR:

Charity Delaney/MCIEAST-MCB CAMLEJ

Dave Cleland/NAVFAC

PREPARED BY:

CH2M HILL

DATE:

March 25, 2014



Randy McElveen/NCDENR Gena Townsend/USEPA

This Technical Memorandum presents a summary of the supplemental groundwater investigations conducted during 2011 and 2012 at Operable Unit (OU) 1, Site 78, Marine Corps Installations East-Marine Corps Base Camp Lejeune (MCIEAST-MCB CAMLEJ), North Carolina (Figure 1). Based on the expansive groundwater plume and recent long-term monitoring (LTM) data, this supplemental investigation was conducted to evaluate if the LTM program and land use controls (LUCs) remain protective in the short-term and support the future evaluation of alternative treatment technologies for long-term protectiveness. This Technical Memorandum provides background information, outlines the supplemental groundwater investigation activities and results, updates the conceptual site model, and provides conclusions and recommendations for LUCs and the LTM program.

1 Background

Site 78, located within the 'Mainside' of MCIEAST-MCB CAMLEJ, is bordered by Holcomb Boulevard to the north, Sneads Ferry Road to the east, Louis Road and Duncan Street to the south, and McHugh Boulevard to the west (Figure 2). The site covers approximately 590 acres in the Hadnot Point Industrial Area (HPIA).

Under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Program, investigations at Site 78 have been conducted since 1983 and the site is currently designated remedy-in-place. An Interim Record of Decision (ROD) (Baker, 1992), Final ROD (Baker, 1994), and Explanation of Significant Difference (ESD) (Baker, 1995) were signed for OU 1. The primary constituents of concern (COCs) at Site 78 were volatile organic compounds (VOCs) and metals in groundwater and pesticides and polychlorinated biphenyls (PCBs) in soil. The selected remedy from the ROD was excavation and offsite disposal of pesticide and PCB-contaminated soil to achieve industrial cleanup levels, groundwater extraction and treatment system, LTM, and LUCs. Soil excavation was completed in 1995 (OHM, 1996), the groundwater treatment system is currently operating, and groundwater LTM is ongoing. A Land Use Control Implementation Plan (LUCIP) restricting aquifer use, groundwater intrusive activities, and non-industrial use was completed in 2001. LUCs were implemented in 2001 and amended in 2002.

Site 78 consists of groundwater VOC plumes in two distinct areas: the northern area in the vicinity of Buildings 901, 902, and 903 (Site 78 North) and the southern area in the vicinity of Buildings 1601 and 1603 (Site 78 South). In between Site 78 North and Site 78 South, there is a petroleum-related groundwater plume associated with the Hadnot Point Fuel Farm (HPFF) that is being addressed separately by the underground storage tank (UST) program. Groundwater within Site 78 North and South is primarily impacted with chlorinated volatile organic compounds (CVOCs) and petroleum-related hydrocarbons. The VOC COCs at Site 78 include VOCs identified in the ROD, other VOCs that have exceeded North Carolina Groundwater Quality Standards (NCGWQS) in the previous four quarters of LTM, and any associated daughter products. The petroleum-related COCs for Site 78 currently include benzene, toluene, ethylbenzene, and total xylenes (BTEX), isopropylbenzene, and 1,2-dichloroethane (DCA). The CVOC COCs currently include tetrachloroethene (PCE), trichloroethene (TCE), cis-1,2-dichloroethene (DCE), vinyl chloride (VC), trans 1,2-DCE, 1,1-DCA, 1,1-DCE, 1,2-dibromo-3-chloropropane, and methylene chloride.

During late 2010 and early 2011, Rhea Engineers & Consultants, Inc. (Rhea) collected preliminary screening data using direct push technology (DPT) groundwater sampling techniques to delineate VOC plumes, as reported in the *Technical Memorandum, Contaminant Plume Delineation, Operable Unit No. 1, Installation Restoration Site 78* (Rhea, 2011) (**Figure 3**). The analytical data collected during this investigation indicated that the well network present at the site was insufficient in defining both lateral and vertical extents of the groundwater plumes.

As a result of Rhea's findings, the Partnering Team recommended further investigation and confirmation of the original results. These follow-on investigations were conducted in a phased approach and included:

- Confirmatory groundwater investigation July through September 2011
- Passive soil gas survey December 2011
- Additional groundwater investigation March through April 2012
- Membrane interface probe (MIP) investigation June 2012
- Vapor intrusion screening based on 2011 and 2012 groundwater analytical results

2 Field Investigations

2.1 Confirmatory Groundwater Investigation (July - September 2011)

The confirmatory groundwater investigation was conducted to confirm the results of the Rhea DPT investigation and refine the extent of the groundwater VOC plumes. The field activities, including monitoring well installation and VOC groundwater sampling, were conducted between July and September 2011 in accordance with the SAP (CH2M HILL, 2011).

Miller Drilling Company, a North Carolina-licensed well driller, used rotosonic drilling techniques to install 26 monitoring wells, including 18 in Site 78 North and eight in Site 78 South (**Figure 3**). The wells were installed within the surficial (up to 30 feet (ft) below ground surface [bgs]), upper Castle Hayne (30 to 60 ft bgs), middle Castle Hayne (60 to 110 ft bgs), and lower Castle Hayne (110 to 150 ft bgs) aquifers, as summarized in **Table 1**.

TABLE 1
Monitoring Well Construction Details

Well Identification (ID)	Installation Date	Total Depth (ft bgs)	Screened Interval (ft bgs)	Aquifer
Site 78 North		, ,		
IR78-GW87MCH	7/28/2011	80	70-80	Middle Castle Hayne
IR78-GW88UCH	8/02/2011	40	30-40	Upper Castle Hayne
IR78-GW89MCH	9/1/2011	70	60-70	Middle Castle Hayne
IR78-GW90MCH	8/31/2011	110	100-110	Middle Castle Hayne
IR78-GW91LCH	8/24/2011	150	140-150	Lower Castle Hayne
IR78-GW92MCH	8/14/2011	70	60-70	Middle Castle Hayne
IR78-GW93MCH	8/13/2011	110	100-110	Middle Castle Hayne
IR78-GW94LCH	8/12/2011	150	140-150	Lower Castle Hayne
IR78-GW95MCH	8/22/2011	70	60-70	Middle Castle Hayne
IR78-GW96MCH	8/16/2011	110	100-110	Middle Castle Hayne
IR78-GW97LCH	8/15/2011	150	140-150	Lower Castle Hayne
IR78-GW98MCH	7/26/2011	90	80-90	Middle Castle Hayne
IR78-GW99MCH	7/26/2011	80	70-80	Middle Castle Hayne
IR78-GW100MCH	7/30/2011	70	60-70	Middle Castle Hayne

TABLE 1
Monitoring Well Construction Details

		Total Depth	Screened Interval	
Well Identification (ID)	Installation Date	(ft bgs)	(ft bgs)	Aquifer
IR78-GW101MCH	7/28/2011	70	60-70	Middle Castle Hayne
IR78-GW102MCH	8/2/2011	70	60-70	Middle Castle Hayne
IR78-GW103MCH	8/1/2011	110	100-110	Middle Castle Hayne
IR78-GW104LCH	7/31/2011	150	140-150	Lower Castle Hayne
Site 78 South				
IR78-GW105MCH	9/2/2011	80	70-80	Middle Castle Hayne
IR78-GW106MCH	8/24/2011	109	99-109	Middle Castle Hayne
IR78-GW107	8/13/2011	30	20-30	Surficial
IR78-GW108UCH	8/11/2011	60	50-60	Upper Castle Hayne
IR78-GW109UCH	7/29/2011	60	50-60	Upper Castle Hayne
IR78-GW110MCH	8/10/2011	90	80-90	Middle Castle Hayne
IR78-GW111MCH	8/1/2011	90	80-90	Middle Castle Hayne
IR78-GW112MCH	8/9/2011	90	80-90	Middle Castle Hayne

Following installation of the monitoring wells, groundwater samples were collected from 119 wells, including the 26 newly installed wells, 82 existing wells, and 11 recovery wells across Site 78 North and Site 78 South, as summarized in **Table 2**.

All samples were shipped under chain-of-custody control via overnight delivery to Environmental Conservation Laboratories, Inc., in Orlando, Florida. All groundwater samples were analyzed for VOCs.

2.1.1 Results

During the confirmatory groundwater investigation, a total of 15 VOCs were detected in the groundwater samples at concentrations exceeding their respective cleanup level and/or the more stringent of the North Carolina Groundwater Quality Standards (NCGWQS) and Safe Drinking Water Act Maximum Contaminant Levels (MCLs). Laboratory analytical data from this phase of investigation are presented in **Tables 3** and **4**. **Figure 3** presents the progression of the understanding of the VOC plumes exceeding NCGWQS/MCLs through the supplemental investigation.

Site 78 North

Tables 5 and **6** present a summary of the BTEX constituents and CVOCs that exceeded NCGWQS/MCLs, respectively. Analytical data confirmed the results of the investigation conducted by Rhea, which indicated contamination was present in groundwater outside of the previous LTM well network (**Figure 3**). The data indicate that BTEX and CVOCs have migrated horizontally and vertically beyond the boundaries of contamination as defined by previous investigations. BTEX and CVOCs were detected northwest of Car Wash Road and were inferred to extend northwest of Holcomb Boulevard. CVOC concentrations increase with depth and the highest concentrations were detected in samples collected from the newly installed monitoring wells screened within the middle Castle Hayne aquifer. Specifically, the highest concentrations were detected in the sample collected from IR78-GW90MCH (100 to 110 ft bgs). Soil boring logs (**Attachment A**) at the locations of monitoring wells IR78-GW90MCH and IR78-GW91LCH indicate gradational changes in lithology between 90 and 106 ft bgs. Poorly

sorted, gravelly sand was observed between 93 to 101 ft bgs, with photo-ionization detector (PID) screening measurements of 61 parts per million (ppm) of VOCs. Beneath the sand layer, fine-grained sandy clay and silty sand were observed from 101 to 105 ft bgs with lower PID readings of 4.4 ppm of VOCs, suggesting that vertical migration of VOCs is retarded by the sandy clay layer. Within the lower Castle Hayne aquifer, VOC concentrations in groundwater are orders of magnitude lower than the VOCs detected in samples collected from the middle Castle Hayne aquifer. Only one CVOC was detected above the NCGWQS/MCL; VC was detected in the groundwater sample collected from monitoring well IR78-GW30-3 (screened from 140 to 150 ft bgs) at a concentration of 3 μ g/L. Due to the discovery of VOCs beyond the boundaries of contamination defined by previous investigations, additional investigation was needed to assess the horizontal distribution of groundwater contamination within the surficial, upper Castle Hayne, and middle Castle Hayne aquifers; to assess the vertical distribution of VOCs in the middle Castle Hayne aquifer; and to evaluate the site for additional sources that may be associated with detections of VOCs in previously unknown areas of contamination.

TABLE 5
BTEX Exceedances, Site 78 North (September 2011)

Analyte	Aquifer	Total Detections	Total Exceedances	Maximum Concentration micrograms per liter (μg/L)	Location of Maximum Concentration
	Surficial	4	4	53	IR78-GW22-1
	Upper Castle Hayne	12	11	180	IR78-GW80IW
Benzene	Middle Castle Hayne (70-90 ft)	5	4	130	IR78-GW92MCH
	Middle Castle Hayne (90-110 ft)	1	1	5.3 J	IR78-GW90MCH
	Lower Castle Hayne	2	1	1.7	IR78-GW30-3
	Surficial	2	0	17	IR78-GW22-1
Toluene	Upper Castle Hayne	1	0	5.5	IR78-GW43
roiuerie	Middle Castle Hayne (70-90 ft)	3	0	16	IR78-GW100MCH
	Lower Castle Hayne	1	0	1.1	IR78-GW30-3
	Surficial	2	0	1.2	IR78-GW22-1
Ethylbenzene	Upper Castle Hayne	1	0	1.6	IR78-GW43
	Middle Castle Hayne (70-90 ft)	2	0	10	IR78-GW100MCH
	Surficial	2	0	17	IR78-GW22-1
Xylenes, total	Upper Castle Hayne	1	0	11	IR78-GW43
xylenes, total	Middle Castle Hayne (70-90 ft)	2	0	12	IR78-GW30-2; IR78- GW100MCH

TABLE 6
CVOC Exceedances, Site 78 North (September 2011)

Analyte	Aquifer	Total Detections	Total Exceedances	Maximum Concentration (μg/L)	Location of Maximum Concentration
DCE	Middle Castle Hayne (70-90 ft)	2	2	6.3	IR78-GW89MCH
PCE	Middle Castle Hayne (90-110 ft)	2	1	140 J	IR78-GW90MCH
	Surficial	2	1	3.3	IR78-GW24-1
	Upper Castle Hayne	8	2	15	IR78-GW71
TCE	Middle Castle Hayne (70-90 ft)	2	2	150	IR78-GW89MCH
	Middle Castle Hayne (90-110 ft)	1	1	9,500	IR78-GW90MCH
	Lower Castle Hayne	1	0	0.64 J	IR78-GW94LCH

TABLE 6

CVOC Exceedances, Site 78 North (September 2011)

Analyte	Aquifer	Total Detections	Total Exceedances	Maximum Concentration (μg/L)	Location of Maximum Concentration
	Surficial	4	2	110	IR78-GW24-1
Cic 1 2 DCE	Upper Castle Hayne	12	5	420	IR78-GW71
Cis-1,2-DCE	Middle Castle Hayne (70-90 ft)	6	1	200	IR78-GW89MCH
	Middle Castle Hayne (90-110 ft)	3	2	6,700	IR78-GW90MCH
	Surficial	3	3	25	IR78-MWVI01
	Upper Castle Hayne	7	7	250	IR78-GW71
VC	Middle Castle Hayne (70-90 ft)	4	4	95	IR78-GW100MCH
	Middle Castle Hayne (90-110 ft)	2	2	110 J	IR78-GW90MCH
	Lower Castle Hayne	1	1	3	IR78-GW30-3

Site 78 South

Tables 7 and **8** present a summary of the BTEX constituents and CVOCs that exceeded NCGWQS/MCLs, respectively. Analytical data confirmed the results of the investigation conducted by Rhea (**Figure 3**). Review of the analytical data indicates that the distribution of BTEX constituents and CVOCs within the surficial aquifer has been defined. However, newly discovered areas of contamination within the upper and middle Castle Hayne aquifers were not defined. The highest concentrations of BTEX and CVOC constituents were detected in samples collected from the upper Castle Hayne aquifer beyond the boundaries of contamination defined by previous investigations. In particular, the highest TCE concentration at Site 78 was detected in the sample collected from the newly installed monitoring well IR78-GW109UCH (screened from 50 to 60 ft bgs). Additional investigation was needed to further assess the horizontal and vertical distribution of contamination within the upper Castle Hayne aquifer; to assess the vertical distribution of VOCs within the middle and lower Castle Hayne aquifers in the vicinity of IR78-GW109UCH; and to evaluate the site for additional sources that may be associated with detections of VOCs in previously unknown areas of contamination.

TABLE 7
BTEX, Site 78 South (September 2011)

Analyte	Aquifer	Total Detections	Total Exceedances	Maximum Concentration (μg/L)	Location of Maximum Concentration
	Surficial	3	2	220	IR78-GW53R
Benzene	Upper Castle Hayne (30-50 ft)	7	7	1,100	IR78-GW75-1
	Upper Castle Hayne (50-60 ft)	1	0	0.64 J	IR78-GW109UCH
	Surficial	4	0	210	IR78-GW60
Toluene	Upper Castle Hayne (30-50 ft)	7	4	15,000	IR78-GW75-1
	Middle Castle Hayne	1	0	0.68 J	IR78-GW86DW
	Surficial	3	1	1,900	IR78-GW60
Ethylbenzene	Upper Castle Hayne (30-50 ft)	7	3	1,500	IR78-GW77
Xylenes, total	Surficial	3	2	8,200	IR78-GW60
	Upper Castle Hayne (30-50 ft)	7	4	5,500	IR78-GW77

TABLE 8

CVOC Exceedances, Site 78 South (September 2011)

		Total		Maximum Concentration	Location of Maximum Concentration
Analyte	Aquifer	Detections	Total Exceedances	(μg/L)	Concentration
	Surficial	2	2	10	IR78-GW73
PCE	Upper Castle Hayne (30-50 ft)	2	2	2.9	IR78-GW75-1
	Surficial	8	5	420	IR78-GW60; IR78- GW76
TCE	Upper Castle Hayne (30-50 ft)	7	5	200	IR78-GW77
	Upper Castle Hayne (50-60 ft)	1	1	12,000	IR78-GW109UCH
	Middle Castle Hayne	1	1	28	IR78-GW105MCH
	Surficial	14	2	500	IR78-GW42
Cis-1,2-	Upper Castle Hayne (30-50 ft)	9	5	160	IR78-GW74; IR78- GW75-2
DCE	Upper Castle Hayne (50-60 ft)	1	1	360	IR78-GW109UCH
	Middle Castle Hayne	2	0	14	IR78-GW105MCH
	Surficial	7	7	140	IR78-GW42
VC	Upper Castle Hayne (30-50 ft)	5	5	180	IR78-GW52R
	Upper Castle Hayne (50-60 ft)	1	1	2.5	IR78-GW109UCH

2.2 Passive Soil Gas Survey (December 2011)

Based on the results of the confirmatory groundwater investigation, a passive soil gas survey was conducted in an effort to identify potential source areas for the VOCs detected Site 78 North beyond the boundaries of contamination defined by previous investigations (**Figure 3**). The passive soil gas survey was conducted where groundwater results exhibited elevated concentrations of CVOCs to the west and northwest of Building 902 at monitoring wells IR78-GW89MCH, IR78-GW90MCH, IR78-GW92MCH, IR78-GW93MCH, and IR78-IR78-GW96MCH. The highest concentration of TCE was detected in the sample collected from IR78-MW90MCH (9,500 μ g/L), suggesting that there may be additional sources between the previously identified source area at Building 902 and Holcomb Boulevard.

In December 2011, 31 passive soil gas modules were deployed on a 150-foot grid pattern within Site 78 North, as shown on **Figure 4**. Prior to installation of each module, a PID was used to screen the sample location for VOCs. Each passive soil gas module, fitted with a sampling cap, was then inserted 4 inches inside a metal pipe that had been placed to a depth of 12 inches bgs. The open end of the pipe was plugged and covered with soil.

Following a 17-day residence period, all modules were removed from the subsurface in the same order as they were installed. The sealed and labeled modules were placed in individual plastic bags and shipped under chain of custody to Beacon Environmental Services, Inc., for laboratory analysis of target compound list (TCL) VOCs by a modified USEPA Method 8260C.

2.2.1 Results

The analytical data from the passive soil gas survey are summarized in **Table 9** and detections are shown on **Figure 4**. Five VOCs, including toluene, PCE, TCE, cis-1,2-DCE, and trans-1,2-DCE, were detected in the passive soil

gas samples. Toluene was detected at relatively low concentrations in nine of the 31 samples, ranging from 36 nanograms (ng) (IR78-SG111 and IR78-SG113) to 365 ng (IR78-SG100). CVOCs were only detected in passive soil gas samples collected from two locations: IR78-SG116, with a total of 4,424 ng of CVOCs, and IR78-SG124, with a total of 26 ng of CVOCs. Analytical results were two orders of magnitude higher in the soil gas sample collected from IR78-SG116 than in the sample from IR78-SG124, suggesting surficial contamination potentially representative of an independent source area.

2.3 Additional Groundwater Investigation (March - April 2012)

Based on the results of the confirmatory groundwater investigation and passive soil gas survey, an additional investigation, including monitoring well installation and groundwater sample collection, was conducted to further assess VOC distribution at Site 78 North and South. In 2012, Drill Pro, LLC, a North Carolina-licensed well driller, installed 10 monitoring wells via rotosonic drilling techniques as presented in **Table 10** below and illustrated on **Figure 3**.

At Site 78 North, three monitoring wells were installed in the surficial aquifer; one monitoring well was installed in the upper Castle Hayne aquifer; and two monitoring wells were installed in the middle Castle Hayne aquifer. At Site 78 South, two monitoring wells were installed in the upper Castle Hayne aquifer; one monitoring well was installed in the middle Castle Hayne aquifer; and one monitoring well was installed in the lower Castle Hayne aquifer (Figure 3). Well construction details and rationale for well installation locations are summarized in Table 10.

TABLE 10

Monitoring Well Construction Details

Well ID	Installation Date	Total Depth (ft bgs)	Screened Interval (ft bgs)	Aquifer	Installation Rationale
Site 78 North					
IR78-GW113	3/31/12	20	10-20	Surficial	Assessment of potential source area between Building 902 and Holcomb Boulevard
IR78-GW114	4/1/12	20	10-20	Surficial	Assessment of potential source area based on elevated detections of VOCs in passive soil gas sample collected at this location
IR78-GW115	3/31/12	20	10-20	Surficial	Refine upgradient extent of CVOCs to delineate the plume
IR78-GW116MCH	3/28/12	110	105-110	Middle Castle Hayne	Assess vertical distribution of VOCs in relation to the fine-grained silt and sandy clay observed in the vicinity of IR78-GW90MCH
IR78-GW117UCH	4/1/12	60	50-60	Upper Castle Hayne	Evaluate potential VOC mass migration along anticipated groundwater flow path
IR78-GW126MCH	4/4/12	90	80-90	Middle Castle Hayne	Assess vertical distribution of VOCs in relation to the fine-grained silt and sandy clay observed in the vicinity of IR78-GW90MCH
Site 78 South					
IR78-GW121UCH	3/30/12	60	50-60	Upper Castle Hayne	Assess vertical distribution of VOCs in relation to the clay layer observed in the vicinity of IR78-GW109UCH
IR78-GW123UCH	4/13/12	60	50-60	Upper Castle Hayne	Assess vertical distribution of VOCs in relation to the clay layer observed the vicinity of IR78-GW109UCH
IR78-GW128MCH	4/19/12	105	100-105	Middle Castle Hayne	Refine the vertical delineation of VOCs in the vicinity of IR78-GW109UCH
IR78-GW129LCH	11/10/12	150	145-150	Lower Castle Hayne	Define the vertical extent of VOCs in the vicinity of IR78-GW109UCH

Following installation of the monitoring wells, groundwater samples were collected from 11 wells, including the 10 newly installed wells and one existing well, as summarized in **Table 2.** Groundwater samples were collected in accordance with the SAP (CH2M HILL, 2011). During the installation of IR78-GW113 at Site 78 North, a monitoring well with no well tag was observed near the drilling location. This well is suspected to be associated with an investigation conducted at Building 902. The total well depth was gauged and measured to be 77 ft bgs. A groundwater sample was collected from the well, identified as IR78-GWXXMCH. This monitoring well has since been abandoned due to military construction (MILCON).

All samples were shipped under chain-of-custody control via overnight delivery to Environmental Conservation Laboratories, Inc., in Orlando, Florida. All groundwater samples were analyzed for VOCs.

Due to the presence of clay within the screened intervals, monitoring wells IR78-GW90MCH at Site 78 North and IR78-GW109UCH at Site 78 South were abandoned in March and April 2012 in accordance with North Carolina well drilling standards to avoid the potential for preferential pathways between portions of the aquifers not previously in direct communication (**Figures 5** and **6**).

2.3.1 Results

Analytical data for Site 78 North and Site 78 South are presented in **Tables 3** and **4**, respectively. VOC plumes exceeding the NCGWQS/MCLs are shown on **Figure 3**.

Site 78 North

Tables 11 and **12** present a summary of the BTEX constituents and CVOCs that exceeded NCGWQS/MCLs, respectively. BTEX constituents were only detected above method detection limits in groundwater samples collected from the middle Castle Hayne aquifer. CVOCs, however, were detected at concentrations exceeding NCGWQS/MCLs in samples collected from the surficial, upper Castle Hayne, and middle Castle Hayne aquifers. The highest concentrations of CVOCs were detected in samples collected from the middle Castle Hayne aquifer, in the vicinity of the newly identified VOC plume near IR78-GW90MCH (**Figure 3**).

TABLE 11
BTEX Exceedances, Site 78 North (April, 2012)

Analyte	Aquifer	Total Detections	Total Exceedances	Maximum Concentration (µg/L)	Location of Maximum Concentration
Benzene	Middle Castle Hayne (70-90 ft)	2	1	2.4	IR78-GWXXMCH
Toluene	Middle Castle Hayne (70-90 ft)	1	0	2.3	IR78-GWXXMCH

TABLE 12

CVOC Exceedances, Site 78 North (April, 2012)

Analyte	Aquifer	Total Detections	Total Exceedances	Maximum Concentration (µg/L)	Location of Maximum Concentration
	Surficial	1	1	14	IR78-GW114
PCE	Middle Castle Hayne (70-90 ft)	1	1	89	IR78-GW126MCH
	Middle Castle Hayne (95-110 ft)	1	1	47	IR78-GW116MCH
	Surficial	2	1	9.5	IR78-GW114
	Upper Castle Hayne	1	1	23	IR78-GW117UCH
TCE	Middle Castle Hayne (70-90 ft)	1	1	1,100	IR78-GW126MCH
	Middle Castle Hayne (95-110 ft)	1	1	2,700	IR78-GW116MCH

TABLE 12

CVOC Exceedances, Site 78 North (April, 2012)

Analyte	Aquifer	Total Detections	Total Exceedances	Maximum Concentration (μg/L)	Location of Maximum Concentration
	Surficial	2	0	20	IR78-GW113
	Upper Castle Hayne	1	0	9	IR78-GW117UCH
Cis-1,2- DCE	Middle Castle Hayne (70-90 ft)	1	1	320	IR78-GW126MCH
	Middle Castle Hayne (95-110 ft)	1	1	710	IR78-GW116MCH
	Upper Castle Hayne	1	1	1.7J	IR78-GW117UCH
VC	Middle Castle Hayne (70-90 ft)	2	2	14	IR78-GW126MCH
	Middle Castle Hayne (95-110 ft)	1	1	25	IR78-GW116MCH

Compound-specific Isotope Analysis

As part of the additional groundwater investigation, isotopic fingerprinting was conducted by performing compound-specific isotope analysis (CSIA) for carbon and chlorine to assess whether the TCE detected in the groundwater sample collected from IR78-GW116MCH is related to the suspected source area at Building 902, or if separate sources are responsible for these detections. The analysis examined the isotopic ratios of 13 C (δ^{13} C) and 37 Cl (δ^{37} Cl) of TCE and its daughter products in groundwater samples collected from monitoring wells located along the flow path from Building 902 to IR78-GW116MCH (IR78-GW72, IR78-GW114, IR78-GW116MCH, and IR78-GW117UCH).

The CSIA data are summarized in **Table 13**. The CSIA data and analytical results for TCE in groundwater collected from IR78-GW72 in the vicinity of Building 902 indicate that TCE has degraded and transformed completely, with -6.77 per mil δ^{13} C and 8.2 per mil δ^{37} Cl. Analytical results for groundwater samples collected from downgradient monitoring wells IR78-GW113 and IR78-GW100MCH also indicate TCE degradation. Conversely, the CSIA data collected from IR78-GW116MCH and IR78-GW117UCH indicate δ^{13} C of -21.11 per mil and -21.93 per mil, respectively, and δ^{37} Cl of 4.3 per mil. These results indicate a significantly different pattern of the CSIA, suggesting that the TCE detected in the samples collected from IR78-GW116MCH and IR78-GW117UCH is not likely linked to the known source at Building 902.

Site 78 South

Tables 14 and **15** present a summary of the detections of BTEX constituents and CVOCs, respectively. BTEX constituents were not detected above NCGWQS/MCLs in the samples collected during the additional groundwater investigations. CVOCs were detected at concentrations exceeding the NCGWQS/MCL in samples collected from the 50- to 60-foot zone of the upper Castle Hayne aquifer and one sample collected from the middle Castle Hayne aquifer. Within the 50- to 60-foot zone of the upper Castle Hayne aquifer, the concentrations of CVOCs detected in IR78-GW121UCH were similar to those detected in IR78-GW109UCH, as presented in **Table 4**. In the soil boring at the location of IR78-GW121UCH, the clay layer was not encountered (**Figure 6**). These findings indicate that the clay layer is discontinuous and does not retard vertical migration of VOCs. VOCs were not detected above method detection limits in the sample collected from the lower Castle Hayne aquifer.

TABLE 14
BTEX Exceedances, Site 78 South (April 2012)

Analyte	Aquifer	Total Detections	Total Exceedances	Maximum Concentration (μg/L)	Location of Maximum Concentration
Toluene	Upper Castle Hayne (50-60 ft)	1	0	1.3 J	IR78-GW124UCH
	Middle Castle Hayne	1	0	2.3	IR78-GW128MCH

TABLE 15
CVOC Exceedances, Site 78 South (April 2012)

Analyte	Aquifer	Total Detections	Total Exceedances	Maximum Concentration (μg/L)	Location of Maximum Concentration
TCE	Upper Castle Hayne (50-60 ft)	2	2	11,000	IR78-GW121UCH
	Middle Castle Hayne	1	1	11	IR78-GW128MCH
Cis-1,2- DCE	Upper Castle Hayne (50-60 ft)	2	2	430	IR78-GW121UCH

2.4 Membrane Interface Probe Investigation (June 2012)

Analysis of groundwater results identified a previously unknown area of impacted groundwater in the vicinity of monitoring well IR78-GW109UCH. In June 2012, a MIP investigation was conducted in this area to further characterize the distribution of VOCs and to evaluate potential source areas. MIP was selected because it allows for real-time continuous qualitative measurements of relative VOC concentrations using a PID, flame ionization detector (FID), and electron capture detector (ECD). Soil properties (including indirect pore pressure and electrical conductivity) are also measured to assess subsurface lithological conditions. MIP results and data logs are included in **Attachment B**.

As shown on **Figure 7**, a total of 14 MIP borings were advanced using a DPT drill rig. Total depths ranged from 27.5 ft bgs (MIP-08) to 58.5 feet bgs (MIP-06), as determined by drilling refusal. Based on the boring logs for wells in the vicinity of the MIP investigation (IR78-GW109UCH, IR78-GW121UCH, and IR78-GW123UCH, see **Attachment A**), rod refusal appears to correlate with intervals where fine grained silty sand with partially cemented sand fragments were encountered. The first MIP boring (MIP-01) was located next to IR78-GW121UCH and the data collected were used to calibrate the MIP response against known VOC concentrations (**Figure 6**). Subsequent borings radiated outwards to capture a gross horizontal extent, then returned inward to refine the extent of impacted soil and groundwater. ECD responses above background levels in MIP-01 were measured between 50 and 58 feet bgs, with a maximum measurement of 1.1×10^6 microvolts (μ V) measured between 52 ft bgs and refusal (58 ft bgs), correlating with high VOC concentrations detected in groundwater samples collected from IR78-GW109UCH. The lower extent of contamination was not delineated in this area using MIP, as a decreased ECD response was not measured in the boring prior to rod refusal. Because refusal depth appears to correlate with intervals where fine grained silty sand with partially cemented sand fragments were encountered, VOCs may be vertically controlled by lithologic units within this limited area.

ECD responses of $10^6 \,\mu\text{V}$ were measured in three other MIP borings (MIP-09, MIP-11, and MIP-13). Of these, the shallowest ECD responses were observed in MIP-11, between 36 and 58 ft bgs, with responses of $10^6 \,\mu\text{V}$ observed between 43 and 50 ft bgs and between 56 to 58 ft bgs. As with MIP-01, the ECD response did not decrease prior to drilling refusal at this location and the lower extent of contamination was not encountered, again suggesting vertical control of VOCs by lithologic units. At MIP-9, elevated ECD responses were observed from approximately 44 to 52 ft bgs, and then decreased to background levels at 53 ft bgs. ECD responses of $10^6 \,\mu\text{V}$ were measured in

MIP-13 between 46 and 50 ft bgs and similarly decreased to background levels at 53 ft bgs. A slightly lesser ECD response of $10^5 \, \mu V$ was measured at approximately 50 ft bgs in MIP borings MIP-14 and MIP-12, suggesting the presence of VOCs at decreasing concentrations in these areas. ECD responses decreased to background levels in each of these locations prior to refusal. At eight of the MIP boring locations, elevated ECD responses were not measured.

The area of highest ECD responses correspond with high VOC concentrations measured in groundwater samples collected from nearby monitoring wells that are screened within similar intervals. The highest responses were measured in MIP locations near the intersection of Gum Street and Hammond Road (**Figure 7**). The shallowest ECD responses were measured in MIP-11, suggesting a potential source area near, or slightly northeast, of that location.

2.5 Vapor Intrusion Screening

Site 78 was included as part of the phased Basewide vapor intrusion (VI) evaluation to determine if complete or significant exposure pathways exist for VI into buildings located within 100 ft of the shallow groundwater plumes (CH2M HILL, 2009 and CH2M HILL, 2011). Overall, the evaluation concluded that VI is not a current significant pathway of concern for the buildings associated with CERCLA Site 78. However, a potential for the VI pathway to become significant at Building 902 was identified. As a result, a vapor intrusion mitigation system (VIMS) was installed at Building 902 as a proactive measure. The VIMS began operation in early 2012. The Basewide VI evaluation recommended additional subslab soil gas and indoor air sampling at Buildings 1601 and 1606 (Figure 2), due to detections of VOCs in subslab soil gas above the Base-specific soil gas screening levels. The additional investigation was conducted in 2013 and the results are pending.

The VOC plumes in the surficial aquifer in both Site 78 North and Site 78 South are located within 100 ft of buildings in the HPIA. Therefore, groundwater analytical data collected as part of this supplemental investigation were compared to groundwater screening levels (GWSLs) to re-evaluate the potential for VI (**Tables 16** and **17**).

At Site 78 North, groundwater samples collected from the surficial aquifer monitoring wells between September 2011 and May 2012 contained concentrations of VOCs above GWSLs (**Table 16**). These samples were collected from wells located closest to Buildings 902 and 903. Building 902 has a VIMS installed and is included in the VIMS monitoring program. Building 903 was evaluated as part of the Basewide VI evaluation and no further action was recommended based on the results of groundwater, soil gas, subslab soil gas, and indoor air samples. No additional buildings were identified for further evaluation.

At Site 78 South, groundwater samples collected from the surficial aquifer monitoring wells between September 2011 and May 2012 exhibited concentrations of VOCs exceeding GWSLs (**Table 17**). The samples with VOC concentrations exceeding GWSLs were collected from wells located within 100 ft of Buildings 1601 and 1603. Building 1601 is being investigated further as part of the Basewide VI evaluation in 2013 and results are pending. Building 1603 was not recommended for further investigation under the Basewide VI evaluation. Based on site conditions during the investigation, the VI pathway was not considered significant. VI at Building 1603 is being monitored as part of the ongoing Treatability Study at Site 78. No additional buildings were identified for further evaluation.

3 Conceptual Site Model

The Site 78 Conceptual Site Model is described in **Table 18**, followed by a summary of the nature and extent of groundwater contamination and depicted on **Figure 8**.

TABLE 18

Conceptual Site Model

Cia -	^		
Site	COL	ıaıtı	ons

Land Use and Physical Characteristics

Site 78 covers approximately 590 acres and includes maintenance shops, warehouses, painting shops, printing shops, auto body shops, and other small industrial facilities. The majority of the site area is paved (e.g., roadways, parking lots, loading dock areas, and storage lots); however, there are many small lawn areas associated with individual buildings within the site and along lengthy stretches of roadways. Recreational ball fields and a parade ground are located in the southwest corner of the site.

The topography of the HPIA is relatively flat and ranges in elevation from 15 to 25 ft above mean sea level. In general, the area with the highest elevation is located in the northeastern portion of the HPIA and slopes gently to the southeast and south. The HPIA is drained by a series of road-side ditches and storm sewers that in turn flow into tributaries of Cogdels Creek, which discharges to the New River (Figures 1 and 2).

Geology

<u>Undifferentiated Formation:</u> 0 to 25 ft bgs. Sand, clay, sandy clay, and silt. Areas of perched groundwater are likely attributed to localized less-permeable clay lenses occluding rainwater from infiltrating the surficial aquifer.

Belgrade Formation: 10 to 30 ft bgs. Laterally discontinuous clay layer.

<u>River Bend Formation</u>: 30 to 150 ft bgs. Silty, medium-to-coarse-grained sand with shell fragments and cemented sands.

<u>Castle Hayne Formation</u>: Greater than 150 ft bgs. Poorly indurated and well-indurated biomicrite and biomicrudite limestone.

Hydrogeology

<u>Surficial Aquifer</u> – Located within the undifferentiated formation and extends from the water table to 30 ft bgs. Groundwater flow is to the southwest. Areas of perched groundwater are present where precipitation accumulates within the vadose zone atop lenses of fine-grained materials. Groundwater depressions are present in Site 78 North, likely due to drawdown from the groundwater treatment system.

<u>Castle Hayne Aquifer</u>: Located within the River Bend formation, it extends from 30 to 150 ft bgs and is divided into three units.

- Upper Castle Hayne aquifer 30 to 60 ft. bgs. Groundwater flow is to the southwest.
- Middle Castle Hayne aquifer 60 to 125 ft bgs. Groundwater flow is to the northwest (Site 78 North) and southwest (Site 78 South).
- Lower Castle Hayne aquifer 125 to 150 ft bgs. Groundwater flow is to the northwest (Site 78 North) and southwest (Site 78 South).

<u>Confining Unit</u> – Where the Belgrade formation is present, the clay layer acts as a confining unit between the surficial aquifer and Castle Hayne aquifer, inhibiting vertical migration.

Source Areas

Site 78 North

Historical and current industrial activities at the site are likely the source of CVOC contamination in the vicinity of Building 902 and the area between Holcomb Boulevard and Car Wash Road.

Site 78 South

BTEX contamination is likely related to releases from USTs. CVOC contamination in the vicinity of Building 1601 and Building 1603 is likely attributable to historical and current industrial activities.

Migration Pathways

Groundwater

Groundwater in the surficial and upper Castle Hayne aquifers flows in a west/southwesterly direction toward the New River. Where the confining unit is not present, the surficial aquifer and Castle Hayne aquifers are hydraulically connected and vertical migration can occur. Contamination appears to be vertically influenced by lithologic units. Vertical migration may be retarded by the presence of localized sandy clay and silt layers.

Groundwater elevation data collected during the confirmatory groundwater investigation were used to estimate the groundwater flow directions in the four hydrostratigraphic units. Potentiometric surface maps are shown on **Figures 9** through **12**.

TABLE 18

Conceptual Site Model	
VI	Potential exists for VOC migration from groundwater into indoor air. Groundwater at Site 78 is being evaluated every five years to assess potential migration of CVOCs from contaminated groundwater into overlying buildings and evaluate potential risks to indoor air receptors. A VIMS was installed at Buildings 902 associated with Site 78. VIMS have also been installed at 10 buildings associated with the UST program. If new buildings are planned for construction in the vicinity of the groundwater plumes, the potential for a VI pathway will be evaluated and mitigated, if needed.
Potential Receptors	
Future Adult and Child Residential Receptors	Ingestion of or dermal contact with VOCs and metals in groundwater and pesticides and PCBs in soil; exposure to VOCs in indoor air
Current and Future Industrial Workers	Exposure to VOCs in indoor air through vapor intrusion
Current and Future Construction Workers	Dermal contact with VOCs in groundwater
Selected Remedy	
ROD (1994)	Soil removal to industrial levels (1995)
	Groundwater Extraction and Treatment System (1995-present)
	LTM for groundwater (1995-present)
	LUCs (2001-present)
	Non-Industrial Use Control (Soil)
	Intrusive Activities Control (Groundwater)

Nature and Extent of VOCs in Groundwater

Aquifer Use Control (1,000 feet)

Based on the results of the supplemental investigation presented above, VOC plumes were updated for each aquifer. Figures 13 through 16 show the extent of BTEX and CVOC detections in groundwater, as well as the areas of BTEX and CVOC concentrations in exceedance of NCGWQS/MCLs for Site 78 North and Site 78 South, respectively. Summaries of the nature and extent of VOC groundwater contamination by aquifer for Site 78 North and Site 78 South are presented in this section.

Site 78 North

Surficial Aquifer

- BTEX and CVOC constituents were detected in the samples collected from the surficial aquifer (Figures 13 and 14), with benzene and cis-1,2-DCE detected the most frequently.
- The BTEX and CVOC plume configurations in the surficial aquifer are generally the same as defined by previous investigations, with the exception of detections of CVOCs in two newly installed wells to the northwest (IR78-GW113 and IR78-GW114) (Figures 3, 13, and 14).
 - Two areas of BTEX detections in exceedance of NCGWQS/MCLs were identified: one near Building 902 and one in the center of the site within the HPFF. The extent of exceedances near Building 902 is delineated, as indicated by the absence of BTEX at concentrations exceeding NCGWQS/MCLs in groundwater samples collected from monitoring wells IR78-MWVI01, IR78-GW22, IR78-GW40, IR78-GW48, and IR78-GW85. Groundwater samples were only collected from one monitoring well within the HPFF, IR78-GW22-1 and BTEX was detected but is being addressed by the UST program.

- The CSIA indicated that CVOCs detected northwest of Building 902 are likely not linked to contaminant sources at Building 902. As a result, two plumes of CVOCs detected in exceedance of NCGWQS/MCLs were identified: one near Building 902 and one to the northwest of Building 902. In the vicinity of Building 902, the CVOC plume is delineated, as indicated by the absence of CVOCs at concentrations exceeding NCGWQS/MCLs in groundwater samples collected from monitoring wells IR78-GW22, IR78-GW25, IR78-GW40, IR78-GW113, and IR78-GW115. An isolated PCE and TCE exceedance of NCGWQS/MCLs was detected in the groundwater sample collected from monitoring well IR78-GW114, located northwest of Building 902.
- Monitoring wells where groundwater samples exhibit VOC concentrations in exceedance of NCGWQS/MCLs are located within the existing Intrusive Activities Control boundary, with the exception of IR78-GW114 (Figure 14), located to the northwest, and IR78-GW22-1 (Figure 13), located within the HPFF. Monitoring well IR78-GW22-1 is also located just outside of the existing Aquifer Use Control boundary.

Upper Castle Hayne Aquifer

- BTEX and CVOCs were detected in the groundwater samples collected from the upper Castle Hayne aquifer (Figures 13 and 14), with benzene and cis-1,2-DCE detected the most frequently.
- The BTEX and CVOC plume configurations within the upper Castle Hayne aquifer are generally the same as defined by previous investigations, with the exception of detections of CVOCs in one newly installed well to the northwest (IR78-GW117UCH) (Figures 3, 13, and 14).
 - Two areas of BTEX detections in exceedance of NCGWQS/MCLs are present: one in the area west of Birch Street and one in the vicinity of Building 902. The BTEX plume located west of Birch Street, identified during a previous investigation of the HPIA (CH2M HILL, 2010), is not defined downgradient, as indicated by a concentration of benzene (4.3 μg/L) exceeding the NCGWQS in the sample from IR78-GW82IW. CVOCs were detected in two samples collected from this area at concentrations below NCGWQS/MCLs, indicating that the BTEX plume is comingled with CVOCs. The BTEX plume in the vicinity of Building 902 is generally defined, as indicated by concentrations of benzene in upgradient well IR78-RW11 (1.2 μg/L) and downgradient well IR78-GW85IW (1.4 μg/L), which only slightly exceed the NCGWQS of 1.0 μg/L.
 - The CSIA indicated that CVOCs detected northwest of Building 902 are likely not linked to contaminant sources at Building 902. As a result, two areas of CVOC detections in exceedance of NCGWQS/MCLs were identified: one in the vicinity of Building 902 and one in the area northwest of Building 902. The CVOC plume near Building 902 is defined downgradient, as indicated by the absence of CVOCs detected at concentrations exceeding NCGWQS/MCLs in the sample collected from IR78-GW85IW (Figure 14). Isolated detections of CVOCs exceeding NCGWQS/MCLs were detected in the sample collected from IR78-GW117UCH, located to the northwest of Building 902.
 - Monitoring wells where groundwater samples exhibit VOC concentrations in exceedance of NCGWQS/MCLs are located within the existing Aquifer Use Control boundary, with the exception of the wells located west of Birch Street.

Middle Castle Hayne Aquifer

 During installation of monitoring well IR78-GW90MCH, a fine-grained silt and sandy clay was observed just below poorly sorted gravelly sand near 100 ft bgs, which appears to locally stratify contamination in this area. Monitoring wells in the middle Castle Hayne aquifer were screened either above or just below this layer. Therefore, the middle Castle Hayne aquifer is evaluated as two zones: wells screened above the sandy clay layer, from 70 to 90 ft bgs, and those screened below it, from 95 to 110 ft bgs.

- Within the 70- to 90-foot zone:
 - BTEX and CVOCs were detected in the samples collected from this portion of the middle Castle Hayne aquifer (Figures 13 and 14), with benzene, cis-1,2-DCE, and VC the most frequently detected.
 - The BTEX and CVOC plume configurations within this portion of the middle Castle Hayne aquifer are different than defined by previous investigations.
 - Three areas of BTEX detections at concentrations greater than NCGWQS/MCLs have been identified within this zone: near Building 902, to the northwest of Building 902, and west of Birch Street. Benzene was detected at a concentration of 130 µg/L in the groundwater sample collected from monitoring well IR78-GW92MCH, located northwest and downgradient of Building 902, while benzene was detected at concentrations up to two orders of magnitude lower in samples collected upgradient in the vicinity of Building 902, suggesting that the BTEX plumes within Site 78 North are not connected. The extent of BTEX constituents exceeding NCGWQS/MCLs near Building 902 has been defined, as indicated by the absence of BTEX detections above NCGWQS/MCLs in the groundwater samples collected from upgradient wells IR78-GW24-2 and IR78-GW87MCH, side gradient wells IR78-GW98MCH and IR78-GW101MCH, and downgradient well IR78-GW89MCH. The extent of BTEX constituents exceeding NCGWQS/MCLs northwest of Building 902 is generally defined, as indicated by the absence of BTEX constituents above NCGWQS/MCLs in the groundwater samples collected from upgradient well IR78-GW101MCH and downgradient monitoring well IR78-GW102MCH. West of Birch Street, benzene was detected at a concentration of 59 µg/L in the groundwater sample collected from monitoring well IR78-GW80DW. The extent of BTEX constituents exceeding NCGWQS/MCLs is generally defined downgradient as indicated by no detections above NCGWQS/MCLs in the sample collected from IR78-GW81DW.
 - The CSIA indicated that CVOCs detected northwest of Building 902 are likely not linked to contaminant sources at Building 902. As a result, two areas of CVOC detections at concentrations greater than NCGWQS/MCLs have been identified in this zone: near Building 902 and to the northwest of Building 902. Near Building 902, VC is detected at concentrations exceeding NCGWQS. These detections are delineated laterally, as indicated by the absence of CVOC detections above NCGWQS/MCLs in the groundwater samples collected from IR78-GW24-2, IR78-GW98MCH, and IR78-GW101MCH. VC detections near Building 902 are not delineated in the downgradient area between the two plumes. In the area northwest of Building 902, PCE and daughter products were detected at concentrations in exceedance of NCGWQS/MCLs. These detections are not delineated laterally to the south or upgradient between the two plumes; however, they are delineated laterally to the north and downgradient, as indicated by the absence of CVOC detections above NCGWQS/MCLs in groundwater samples collected from monitoring wells IR78-GW89MCH and IR78-GW102MCH, respectively.

• Within the 95 to 110-foot zone:

- BTEX and CVOCs were detected in the groundwater samples collected from this portion of the middle Castle Hayne aquifer (Figures 13 and 14), with cis-1,2-DCE and VC the most frequently detected.
- The BTEX and CVOC plume configurations within this portion of the middle Castle Hayne aquifer are different than defined by previous investigations.
 - One BTEX constituent, benzene, was detected above NCGWQS in one groundwater sample (IR78-GW90MCH). As shown on **Figure 13**, the extent of BTEX concentrations exceeding NCGWQS/MCLs is defined, as indicated by the absence of BTEX constituents at concentrations exceeding NCGWQS/MCLs in groundwater samples collected from upgradient monitoring well IR78-GW101MCH, lateral wells IR78-GW93MCH and IR78-GW96MCH, and downgradient monitoring well IR78-GW103MCH.

- A CVOC plume was identified for the first time in this zone in the area northwest of Building 902.
 As shown on Figure 14, the downgradient extent of CVOC concentrations exceeding NCGWQS/MCLs is generally defined, as indicated by the absence of CVOCs at concentrations exceeding NCGWQS/MCLs in the groundwater sample collected from IR78-GW103MCH; however, the upgradient and lateral extent of exceedances is not defined.
- The highest CVOC concentrations detected at Site 78 North were in groundwater samples collected from monitoring well IR78-GW90MCH, screened within fine-grained silt and sandy clay. Total CVOC concentrations detected in IR78-GW116MCH, screened below the sandy clay, were an order of magnitude lower than those detected in the sample collected from IR78-GW90MCH, suggesting that vertical migration of VOCs is retarded by the sandy clay layer (Figure 5). In the vicinity of IR78-GW90MCH, the lithology transitions from a gravelly sand at approximately 92 ft bgs to more fine-grained silt and sandy clay to 106 ft bgs. As shown on the boring logs for IR78-GW90MCH and IR78-GW91LCH (Attachment A), a higher PID reading (61 ppm) was measured within the gravelly sand. These results suggest that the VOC mass in this area of the site is most likely located just above the fine-grained silt and sandy clay layer.
- Monitoring wells where groundwater samples exhibit VOC concentrations in exceedance of NCGWQS/MCLs in the middle Castle Hayne aquifer are located within the existing Aquifer Use Control boundary, with the exception of IR78-GW80DW, located west of Birch Street, and the inferred extent of VOC concentrations in the area northwest of Building 902.

Lower Castle Hayne Aquifer

- BTEX and CVOCs were detected in the samples collected from the lower Castle Hayne aquifer (**Figures 13** and **14**), with benzene the most frequently detected.
- Isolated detections of VOCs at concentrations above NCGWQS/MCLs were identified, including benzene and VC in the groundwater sample collected from monitoring well IR78-GW30-3 and methylene chloride in the groundwater sample collected from monitoring well IR78-GW91LCH.
- The vertical extent of TCE contamination in the vicinity of IR78-GW90MCH has been defined, as indicated by
 the absence of TCE and its daughter products at concentrations above method detection limits in the
 groundwater sample collected from monitoring well IR78-GW91LCH (Figure 14).
- Monitoring wells where groundwater samples exhibit VOC concentrations in exceedance of NCGWQS/MCLs are located within the existing Aquifer Use Control.

Site 78 South

Surficial Aquifer

- BTEX and CVOC constituents were detected in the groundwater samples collected from the surficial aquifer (Figures 15 and 16), with TCE and cis-1,2-DCE detected the most frequently.
- The BTEX and CVOC plume configurations in the surficial aquifer are generally the same as defined by previous investigations (Figures 3, 15, and 16).
 - BTEX constituents were detected above NCGWQS/MCLs in two areas of Site 78 South: southwest of the intersection of Fir Street and East Road and near Building 1603 (Figure 15). Southeast of the intersection of Fir Street and East Road, the extent of BTEX is generally delineated, as indicated by the absence of BTEX at concentrations exceeding NCGWQS/MCLs in the groundwater samples collected from upgradient monitoring well IR78-GW10 and downgradient monitoring well IR78-GW73. Near Building 1603, the extent of BTEX is generally delineated, as indicated by the absence of BTEX at concentrations exceeding NCGWQS/MCLs in the groundwater samples collected from upgradient well IR78-RW14, sidegradient well IR78-GW04-1, and downgradient wells IR78-GW50 and IR78-GW107. Measurable light non-aqueous phase liquid (LNAPL) was encountered at a thickness of 2.38 ft in

monitoring well IR78-GW58R, located near the intersection of Gum Street and Hammond Road. Because IR78-GW58R is located near a UST site (UST 1617) and LNAPL is indicative of a release from a UST, the presence of LNAPL was reported to the Base Environmental Management Division for further evaluation within the UST program.

• Three areas of CVOC detections at concentrations greater than NCGWQS/MCLs are present within the investigation area: one located near Building 1601, one located southwest of Gum Street, and one associated with UST Site 1613 near Holcomb Boulevard (Figure 16). Near Building 1601, the upgradient extent of CVOCs is defined by the absence of CVOCs at concentrations exceeding NCGWQS/MCLs in the groundwater sample collected from IR78-GW10. The downgradient extent of CVOCs in this area is generally defined as indicated by the absence of CVOCs in the groundwater samples collected from IR78-GW51R and IR78-GW53R. Southwest of Gum Street, the CVOC plume is delineated as indicated by the absence of CVOCs at concentrations exceeding NCGWQS/ MCLs in groundwater samples collected from sidegradient wells IR78-GW02, IR78-GW03, IR78-GW04-1, and IR78-GW50 and downgradient monitoring wells IR78-GW62, IR78-GW63, IR78-GW64, and IR78-GW68. The upgradient extent of this CVOC plume is generally defined as indicated by the absence of CVOCs in the samples collected from IR78-GW51R, IR78-GW53R, and IR78-GW04-1.

BTEX and CVOCs were detected in groundwater samples collected from UST Site 1613 during a previous investigation of the HPIA (CH2M HILL, 2010). UST Site 1613 is located within the Site 94 boundary, which is also within the Site 78 boundary. The BTEX constituents detected in the groundwater samples collected from UST 1613 have been managed under the UST program. In 2007 an *in-situ* Submerged Oxygen Curtain (iSOC) system was installed to facilitate removal of residual petroleum contamination and was removed in 2011 (Catlin, 2013). The CVOC detections at Site UST 1613 were further investigated as part of the Site 94 investigations and were determined to be migrating from Site 78; therefore, the Site 94 ROD designated that the CVOCs be addressed as part of the Site 78 groundwater remediation (CH2M HILL, 2006).

Analytical results from UST Site 1613 are included for evaluation on **Figures 15** and **16**. Concentrations of BTEX above the NCGGWQS/MCLs were detected in samples collected from three monitoring wells (UST1613-MW17, UST1613-MW19, and UST1613-MW22). Concentrations of CVOCs above the NCGGWQS/MCLs were detected in samples collected from three monitoring wells (UST1613-MW03, UST1613-MW17, and UST1613-MW22). The BTEX and CVOC detections near UST Site 1613 are generally delineated downgradient, as indicated by the absence of CVOCs at concentrations exceeding NCGWQS/MCLs in the groundwater sample collected from UST1613-MW08 during the previous HPIA investigation (CH2M HILL, 2010). Based on the flow of groundwater to the southwest, these detections do not appear to be connected to the plumes near Building 1601.

 Monitoring wells where groundwater samples exhibit VOC concentrations in exceedance of NCGWQS/MCLs are located within the existing Intrusive Activities Control and/or Aquifer Use Control boundary.

Upper Castle Hayne

- During installation of monitoring well IR78-MW109UCH, a clay layer was observed at approximately 50 ft bgs.
 To evaluate the potential for local stratification of contamination in this area, monitoring wells were installed
 above and below this clay layer. Therefore, the upper Castle Hayne aquifer in Site 78 South is evaluated as
 two zones: wells screened above the clay layer, from 30 to 50 ft, and wells below the clay layer, from 50 to
 60 ft.
- The MIP investigation suggested the presence of elevated VOC concentrations in the vicinity of Building 1603 from approximately 36 to 58 ft bgs. This is consistent with analytical data for groundwater samples collected from wells screened between 50 and 60 ft bgs, in the vicinity of the MIP investigation.

Within the 30- to 50-foot zone:

- BTEX and CVOCs were detected in the groundwater samples collected from this portion of the upper Castle Hayne aquifer, with benzene, toluene, TCE, and cis-1,2-DCE the most frequently detected.
- The BTEX and CVOC plume configurations within this portion of the upper Castle Hayne aquifer are the same as defined by previous investigations (Figures 3, 15, and 16).
 - The operation of the groundwater treatment system in this zone is potentially influencing the plume configuration; therefore two areas of BTEX detections above NCGWQS/MCLs have been identified: one near Building 1601 and one southwest of Gum Street. The extent of BTEX at concentrations exceeding NCGWQS/MCLs is grossly defined in these areas, as indicated by the absence of BTEX at concentrations exceeding NCGWQS/MCLs in groundwater samples collected from sidegradient wells IR78-RW05, IR78-RW06, IR78-RW08, and IR78-RW14 and downgradient wells IR78-GW67 and IR78-GW65. The upgradient extent of BTEX detections is not defined.
 - CVOC detections above NCGWQS/MCLs were identified in this zone near Building 1601. The downgradient extent of CVOC concentrations exceeding the NCGWQS/MCLs is defined, as indicated by the absence of CVOCs at concentrations exceeding NCGWQS/MCLs in groundwater samples collected from IR78-RW06, IR78-RW07, and IR78-RW08. However, an isolated exceedance of the NCGWQS/MCLs for VC was observed in the groundwater sample collected from IR78-GW65, located southeast of the CVOC plume originating at Building 1601.
 - CVOCs were detected in groundwater samples collected from Site 94 and UST Site 1613 during a previous investigation of the HPIA investigation (CH2M HILL, 2010). As described above, the Site 94 ROD indicated that CVOCs would be addressed as part of the Site 78 groundwater remediation (CH2M HILL, 2006).

Analytical results have been included for evaluation on **Figure 16**. Concentrations of CVOCs above the NCGGWQS were detected in three samples collected from those sites; however, based on the flow of groundwater to the southwest, these detections do not appear to be connected to the plume near Building 1601. These detections are not delineated.

• Within the 50- to 60-foot zone:

- BTEX and CVOCs were detected in the samples collected from this portion of the upper Castle Hayne aquifer, with cis-1,2-DCE and TCE the most frequently detected.
- The VOC plume configurations within this portion of the upper Castle Hayne aquifer are different than defined by previous investigations.
 - BTEX constituents were not detected at concentrations exceeding NCGWQS/MCLs (Figure 15).
 - A CVOC plume was identified for the first time in this zone in the area adjacent to Building 1603 (Figure 16).
 - The extent of CVOC concentrations exceeding NCGWQS/MCLs is defined downgradient, as indicated by the absence of CVOC concentrations exceeding NCGWQS/MCLs in the groundwater sample collected from IR78-GW108UCH. The extent of CVOC concentrations exceeding NCGWQS/MCLs is not defined upgradient or sidegradient.
 - During the confirmatory groundwater investigation, the highest concentrations of TCE detected in any sample collected from Site 78 were observed in the sample collected from IR78-GW109UCH. The boring log for IR78-GW109UCH indicated that a clay layer was present at that location. As a result, additional wells (IR78-GW121UCH and IR78-GW123UCH) were installed to further assess contamination above and below the clay layer. IR78-GW121UCH was installed adjacent to IR78-GW109UCH, and IR78-GW123UCH was installed 50 ft upgradient. A clay layer was not observed in

the borings of the two new wells; therefore, both were installed to the same depth as IR78-GW109UCH (60 ft bgs), with a shorter screen to target the aquifer unit below the clay layer. The concentrations of TCE detected in the groundwater samples collected from IR78-GW121UCH (11,000 $\mu g/L$) and IR78-GW109UCH (12,000 $\mu g/L$) were similar, indicating that there is no localized aquitard impeding vertical downward migration of VOCs in that area of the site (**Figure 6**).

 Monitoring wells where groundwater samples exhibit VOC concentrations in exceedance of NCGWQS/MCLs are located within the existing Aquifer Use Control boundary.

Middle Castle Hayne

- BTEX and CVOC constituents were detected in the groundwater samples collected from the middle Castle Hayne aquifer (Figures 15 and 16), with toluene and TCE the most frequently detected.
- The VOC plume configurations within the middle Castle Hayne aquifer are different than as defined by previous investigations.
 - BTEX constituents were not detected at concentrations exceeding NCGWQS/MCLs. However, an
 isolated detection of the petroleum-related hydrocarbon 1,2-DCA was detected in the sample
 collected from IR78-GW17-2 at a concentration above the NCGWQS.
 - A CVOC plume was identified in the vicinity of Building 1601. The CVOC plume has been defined
 downgradient, as indicated by the absence of CVOC concentrations exceeding NCGWQS/MCLs in the
 groundwater sample collected from IR78-GW110MCH, IR78-GW111MCH, and IR78-GW112MCH. The
 extent of CVOC concentrations exceeding NCGWQS/MCLs is not defined upgradient or sidegradient.
 - TCE was detected in two samples (IR78-GW105MCH, 80 ft bgs and IR78-GW128MCH, 105 ft bgs) at concentrations exceeding NCGWQS/MCL. CVOCs were not detected above method detection limits in the sample collected from IR78-GW106MCH, located adjacent to IR78-GW105MCH and installed to a greater depth of 110 ft bgs, indicating that VOCs are delineated vertically in that location. IR78-GW128MCH is located adjacent to IR78-GW121UCH and indicates that TCE has migrated vertically in that location. However, the concentration of TCE detected in the groundwater sample collected from IR78-GW128MCH (11 μg/L) is three orders of magnitude lower than the concentration detected in IR78-GW121UCH (11,000 μg/L).
- Monitoring wells where groundwater samples exhibit VOC concentrations in exceedance of NCGWQS/MCLs are located within the existing Aquifer Use Control boundary.

Lower Castle Hayne Aquifer

• VOCs were not detected above method detection limits in any groundwater samples collected from the lower Castle Hayne aquifer (Figure 6).

4 Conclusions

The supplemental investigations conducted from 2011-2012 confirmed the results of the Rhea DPT investigation and further refined the extent of the groundwater VOC plumes through multiple phases of investigation within Site 78 North and South as presented below.

Site 78 North

The overall findings from the supplemental groundwater investigation conducted at Site 78 North are as follows:

• The VOC plumes are generally the same as defined by previous investigations in the vicinity of Building 902 and west of Birch Street. However, a CVOC plume was identified for the first time to the northwest of Building 902 in the surficial, upper, middle, and lower Castle Hayne aquifers.

- The VOC distribution within the area northwest of Building 902 appears to be stratified by lithology. In this
 area, the highest concentrations of VOCs are located just above the fine-grained silt and sandy clay layer
 within the middle Castle Hayne aquifer.
- The highest concentrations of BTEX constituents were detected in samples collected from the 70 to 90 ft bgs zone of the middle Castle Hayne aquifer in the vicinity of Building 902. The highest CVOC concentrations were detected in samples collected from the 90 to 110 ft bgs zone of the middle Castle Hayne aquifer northwest of Building 902.
- Evaluation of CSIA and VOC data indicates that there may be different sources of TCE contributing to the CVOC plumes identified northwest of Building 902 and in the vicinity of Building 902. The BTEX and CVOC plumes extend beyond the limits of the existing LTM well network and LUCs.
- Groundwater samples collected from the surficial aquifer monitoring wells contained concentrations of VOCs above GWSLs located near Buildings 902 and 903; however, the results are consistent with the previous Basewide VI evaluations. Building 902 has a VIMS installed and is included in the VIMS monitoring program and no further action was recommended at Building 903.

Site 78 South

The overall findings from the supplemental groundwater investigation conducted at Site 78 South are as follows:

- The VOC plumes within the surficial aquifer are generally the same as defined by previous investigations in the
 vicinity and south of Building 1601 and associated with UST Site 1613/Site 94. However, a VOC plume was
 identified for the first time in the area adjacent to Buildings 1601 and 1603 within the upper and middle
 Castle Hayne aquifers and is not fully delineated laterally. VOCs were not detected in groundwater samples
 collected from the lower Castle Hayne aquifer.
- The highest concentrations of BTEX constituents were detected in samples collected from the 30 to 50 ft bgs zone of the upper Castle Hayne aquifer and the highest CVOC concentrations were detected in samples collected from the 50 to 60 ft bgs zone of the upper Castle Hayne aquifer.
- The BTEX and CVOC plumes extend beyond the limits of the existing LTM well network and LUCs.
- Measurable LNAPL was encountered in monitoring well IR78-GW58R, located near the intersection of Gum Street and Hammond Road and is being addressed by the UST program.
- Groundwater samples collected from the surficial aquifer monitoring wells contained concentrations of VOCs above GWSLs located within 100 ft of Buildings 1601 and 1603. Building 1601 is currently being investigated further as part of the Basewide VI evaluation in 2013 and results are pending. VI at Building 1603 is being monitored as part of the ongoing Treatability study at Site 78. No additional buildings were identified for further evaluation.

5 Recommendations

Based on the results of the supplemental groundwater investigation, the LTM program and LUCs no longer encompass the extent of VOC contamination. Treatability Studies are planned within the area of highest VOC concentrations at Site 78 North and South to evaluate the effectiveness of alternate treatment technologies for long-term protectiveness. However, MILCON activities are currently underway to expand Holcomb Boulevard, which overlaps portions of Site 78 North. As a result, the Site 78 North Treatability Study has been put on hold pending MILCON completion; therefore, the Treatability Study will be conducted within the upper Castle Hayne aquifer at Site 78 South. In the short term, recommendations for changes to the LTM program and LUC boundaries are presented below.

Long-term Monitoring Program

The current LTM Program and recommendations for updates are summarized in **Table 19**. The locations of the current LTM wells and those recommended for inclusion into the LTM Program are shown on **Figures 17** through **23**. The monitoring wells that have been recommended for inclusion were selected based on the location relative to the VOC plumes within their respective aquifer and to provide a means of monitoring VOC concentrations over time and potential horizontal and vertical migration. These include upgradient, sentinel, and downgradient wells located near the leading edge of the plumes; wells located within the newly identified VOC plume areas that are outside of the current monitoring well network; and wells located in deeper aquifer zones.

The MILCON activities within Site 78 North have resulted in the destruction of some of the selected LTM wells. Because MILCON activities overlap areas where VOC plumes have not been defined, it is recommended that the Site 78 North LTM network be re-evaluated pending MILCON completion to determine if additional wells are needed to monitor VOCs.

Within Site 78 South, groundwater samples collected from downgradient monitoring wells located east of McHugh Boulevard contained low detections of VOCs. These monitoring wells will be included in the LTM well network to monitor VOC concentrations and evaluate potential VOC migration. Where VOC plumes are not defined within Site 78 South, the installation of additional delineation wells has been proposed.

TABLE 19 Long-term Monitoring Program

	Aquifer	Monitoring Well	Monitoring Purpose						
Site 78		IR78-GW22	Lateral well						
North		IR78-GW24-1	Monitor concentrations within plume near Building 902						
		IR78-GW41	Monitor concentrations within plume near Building 902						
		IR78-GW46	Monitor concentrations within plume near Building 902						
	Surficial	IR78-GW85	Downgradient						
		IR78-MWVI01	Monitor concentrations within plume near Building 902						
		IR78-GW113	Downgradient						
		IR78-GW114	Downgradient						
		IR78-GW115	Upgradient, sentinel well						
		IR78-GW44	Monitor concentrations within plume near Building 902						
		IR78-GW47	Monitor concentrations within plume near Building 902						
		IR78-GW81IW	Monitor plumes west of Holcomb Blvd						
		IR78-GW82IW	Monitor plumes west of Holcomb Blvd						
		IR78-GW84IW	Monitor concentrations within plume near Building 902						
	Upper Castle	IR78-GW85IW	Downgradient; monitor concentrations within plume near Building 902						
	Hayne	IR78-RW10	Monitor concentrations within plume near Building 902						
		IR78-RW11	Monitor concentrations within plume near Building 902						
		IR78-RW12	Monitor concentrations within plume near Building 902						
		IR78-GW117UCH	Lateral well						
		IR78-GW79IW	Monitor plumes west of Holcomb Blvd						
		IR78-GW80IW	Monitor plumes west of Holcomb Blvd						
	Middle	IR78-GW24-2	Monitor vertical migration and concentrations within plume near Building 902						
	Castle	IR78-GW30-2	Monitor concentrations within plume near Building 902						
	Hayne	IR78-GW80DW	Monitor BTEX plume west of Holcomb Blvd						

TABLE 19 Long-term Monitoring Program

	Aquifer	Monitoring Well	Monitoring Purpose
		IR78-GW81DW	Monitor BTEX plume west of Holcomb Blvd
		IR78-GW87MCH	Lateral well
		IR78-GW89MCH	Monitor concentrations within newly identified plume northwest of Building 902
		IR78-GW92MCH	Monitor concentrations within newly identified plume northwest of Building 902
		IR78-GW93MCH	Monitor concentrations within and along lateral edge of newly identified plume northwest of Building 902
		IR78-GW96MCH	Monitor concentrations within and along lateral edge of newly identified plume northwest of Building 902
		IR78-GW99MCH	Upgradient, sentinel well
		IR78-GW101MCH	Lateral well
		IR78-GW103MCH	Downgradient
		IR78-GW116MCH	Monitor concentrations within newly identified plume northwest of Building 902
	Lower	IR78-GW30-3	Monitor potential vertical migration near Building 902
	Castle Hayne	IR78-GW91LCH	Monitor potential vertical migration northwest of Building 902
	•	IR78-GW94LCH	Monitor potential vertical migration northwest of Building 902
		IR78-GW104LCH	Downgradient
Site 78		IR78-GW04-1	Monitor contaminant concentrations
South		IR78-GW10	Upgradient, sentinel well
		IR78-GW11	Upgradient, sentinel well
		IR78-GW42	Monitor contaminant concentrations
		IR78-GW49	Monitor contaminant concentrations
		IR78-GW50	Lateral edge of CVOC plume
		IR78-GW53R	Monitor contaminant concentrations
		IR78-GW54R	Monitor contaminant concentrations
		IR78-GW59	Monitor contaminant concentrations
		IR78-GW60	Monitor contaminant concentrations
	Surficial	IR78-GW61	Lateral well
		IR78-GW62	Downgradient
		IR78-GW63	Downgradient edge of CVOC plume
		IR78-GW64	Downgradient edge of CVOC plume
		IR78-GW73	Monitor contaminant concentrations
		IR78-RW09R	Downgradient
		UST1613-MW03	Northwest plume
		UST1613-MW17	Northwest plume
		UST1613-MW22	Northwest plume
		IR78-GW56	Isolated CVOC detections
		IR78-GW66	Lateral edge of CVOC plume

TABLE 19 Long-term Monitoring Program

	Aquifer	Monitoring Well	Monitoring Purpose					
		IR78-GW52R	Monitor contaminant concentrations					
		IR78-GW65	Isolated CVOC detections					
		IR78-GW74	Monitor contaminant concentrations					
		IR78-GW83IW	Lateral Well					
		IR78-RW05	Lateral well					
		IR78-RW06	Lateral well					
		IR78-RW07	Downgradient edge of plume					
	Upper Castle	IR78-RW08	Lateral well					
	Hayne	IR78-RW14	Monitor contaminant concentrations					
		IR78-RW15	Monitor contaminant concentrations					
		IR78-GW108UCH	Downgradient of Building 1603					
		UST1613-MW13	Northwest plume					
		IR94-MW02IW	Northwest plume					
		IR94-MW03IW	Monitor concentrations north of Holcomb Boulevard					
_		Three recommended new wells	Upgradient, lateral, and downgradient of Building 1603					
		IR78-GW86DW	Monitor contaminant concentrations					
		IR78-GW105MCH	Monitor concentrations near Building 1601					
	Middle Castle	IR78-GW112MCH	Monitor concentrations downgradient					
	Hayne	IR78-GW128MCH	Monitor concentrations near Building 1603					
		One recommended new well	Downgradient and lateral of Building 1603					
-	Lower	IR78-GW09-3	Monitor contaminant concentrations					
	Castle Hayne IR78-GW129LCH		Vertical migration near Building 1603					

Land Use Control Boundaries

Based on the current extent of the BTEX and CVOC plumes that extend beyond the limits of existing LUCs, updates to LUC boundaries are recommended for Site 78 North and Site 78 South. The HPFF area is being addressed separately by the UST Program under a corrective action plan. The following updates are proposed (**Figure 24**):

- Update the Intrusive Activities Control boundary to encompass VOC exceedances of the NCGWQS/MCL within the surficial aquifer in order to be protective of potential construction workers.
- Update the Aquifer Use Control boundary to extend 1,000 ft from monitoring wells in which VOCs were detected above NCGWQS/MCL in any aquifer.
- Add a LUC for Intrusive and Industrial/Non-Industrial Use Controls to evaluate future buildings and land use for potential VI pathways, prior to construction, within 100 ft of surficial and Castle Hayne groundwater VOCs exceeding NCGWQS/MCLs.

6 References

Baker Environmental, Inc. (Baker). 1992. Interim Record of Decision for Operable Unit No. 1, Site 78, Marine Corps Base Camp Lejeune, North Carolina.

Baker. 1994. Final Record of Decision, Operable Unit No. 1, Sites 21, 24, and IR78, Marine Corps Base Camp Lejeune, North Carolina. September.

Baker, 1995. Explanation of Significant Difference, Operable Unit No. 1. Marine Corps Base Camp Lejeune. October.

Catlin Engineers and Scientists (Catlin). 2013. *Annual Monitoring Report, UST 1613, May 2012 through May 2013, Marine Corps Installations East – Marine Corps Base Camp Lejeune, North Carolina*. July.

CH2M HILL. 2006. Final record of Decision, Operable Unit 18, Site 94, PCS Service Station, Marine Corps Base Camp Lejeune, Jacksonville, North Carolina. April.

CH2M HILL. 2009. Final Vapor Intrusion Evaluation Report, Marine Corps Base Camp Lejeune, Jacksonville, North Carolina. November.

CH2M HILL. 2010. Final Hadnot Point Industrial Area Groundwater Evaluation Report, Marine Corps Base Camp Lejeune, Jacksonville, North Carolina. September

CH2M HILL. 2011. Final Groundwater Sampling and Analysis Plan, Additional Investigation and Treatability Study, Site 78 – Operable Unit No. 1, Marine Corps Base Camp Lejeune, Jacksonville, North Carolina. August.

OHM Remediation Corp. (OHM). 1996. *Contractor's Closeout Report, Soil Remediation, Operable Unit 1, Sites 21 and 78, Marine Corps Base Camp Lejeune, Jacksonville, North Carolina*. October.

Rhea Engineers & Consultants, Inc. (Rhea). 2011. *Technical Memorandum, Contaminant Plume Delineation, Operable Unit No. 1, Installation Restoration Site 78.*



TABLE 2
Groundwater Sampling Summary
Site 78 Technical Memorandum

Well ID	Sampling Method	Sample Date	Total Depth (ft bgs)	Diameter (in)	Screened Interval (ft bgs)	TOC Elevation (ft msl)	Ground Surface Elevation (ft msl)	Depth to Water (ft BTOC)	Depth to Product	Aquifer	Groundwater Elevation (ft msl)
IR78-GW01	PDB	9/15/2011	25	2	5-25	32.92	NA	14.94		Surficial	17.98
IR78-GW02	PDB	9/15/2011	20	2	5-20	32.15	29.90	6.71		Surficial	25.44
IR78-GW03	PDB	9/14/2011	25	2	5-25	31.85	29.50	6.13		Surficial	25.72
IR78-GW04-1	PDB	9/14/2011	25	2	5-25	31.63	28.90	20.21		Surficial	11.42
IR78-GW04-2	PDB	9/14/2011	75	4	65-75	31.01	28.90	19.40		MCH	11.61
IR78-GW05	PDB	9/15/2011	25	2	5-25	28.40	28.60	11.13		Surficial	17.27
IR78-GW08	PDB	9/16/2011	25	2	5-25	28.72	26.30	13.31		Surficial	15.41
IR78-GW09-1	PDB	9/12/2011	22	2	7-22	24.15	24.46	11.15		Surficial	13.00
IR78-GW09-3	PDB	9/12/2011	150	2	130-150	23.42	23.80	11.18		LCH	12.24
IR78-GW10	PDB	9/15/2011	25	2	5-25	28.13	25.70	12.14		Surficial	15.99
IR78-GW11	PDB	9/15/2011	25	2	5-25	28.22	25.50	12.80		Surficial	15.42
IR78-GW12	PDB	9/14/2011	25	2	5-25	30.08	27.60	11.25		Surficial	18.83
IR78-GW13	PDB	9/17/2011	25	2	5-25	26.20	23.80	12.22		Surficial	13.98
IR78-GW14	PDB	9/16/2011	25	2	5-25	27.32	25.00	8.34		Surficial	18.98
IR78-GW16	PDB	9/16/2011	25	2	5-25	32.40	30.10	12.55		Surficial	19.85
IR78-GW17-1	PDB	9/16/2011	25	2	5-25	30.00	27.50	11.73		Surficial	18.27
IR78-GW17-2	PDB	9/16/2011	73	2	53-73	32.14	29.60	10.49		MCH	21.65
IR78-GW17-4	PDB	9/17/2011	20	2	10-20	NA	NA	10.49		Surficial	NA
IR78-GW19	Not Sampled ¹		25	2	5-25	29.07	26.50	5.43		Surficial	23.64
IR78-GW20	PDB	9/16/2011	25	2	5-25	25.33	22.50	8.91		Surficial	16.42
IR78-GW21	PDB	9/17/2011	25	2	5-25	33.51	31.20	9.80		Surficial	23.71
IR78-GW22	PDB	9/16/2011	25	2	5-25	31.92	30.40	7.19		Surficial	24.73
IR78-GW22-1	PDB	9/18/2011	25	2	15-25	31.49	29.50	12.35		Surficial	19.14
IR78-GW23	PDB	9/15/2011	25	2	5-25	31.23	30.00	10.80		Surficial	20.43
IR78-GW24-1	PDB	9/13/2011	25	2	5-25	32.84	30.50	7.72		Surficial	25.12
IR78-GW24-2	PDB	9/13/2011	77	2	57-77	33.73	30.40	13.61		MCH	20.12
IR78-GW24-3	PDB	9/13/2011	148	2	128-148	32.32	30.50	13.83		LCH	18.49
IR78-GW25	PDB	9/15/2011	25	2	5-25	32.58	30.10	9.60		Surficial	22.98
IR78-GW26	PDB	9/16/2011	25	2	5-25	34.95	32.62	9.60		Surficial	25.35
IR78-GW29	PDB	9/14/2011	25	2	5-25	28.82	26.43	21.02		Surficial	7.80
IR78-GW30-2	PDB	9/16/2011	75	4	65-75	29.75	29.96	12.6		MCH	17.15
IR78-GW30-3	PDB	9/16/2011	150	4	140-150	29.72	29.96	12.9		LCH	16.82

TABLE 2
Groundwater Sampling Summary
Site 78 Technical Memorandum

Well ID	Sampling Method	Sample Date	Total Depth (ft bgs)	Diameter (in)	Screened Interval (ft bgs)	TOC Elevation (ft msl)	Ground Surface Elevation (ft msl)	Depth to Water (ft BTOC)	Depth to Product	Aquifer	Groundwater Elevation (ft msl)
IR78-GW31-2	PDB	9/15/2011	75	4	65-75	26.24	26.50	10.85		MCH	15.39
IR78-GW31-3	PDB	9/15/2011	150	4	140-150	25.99	26.30	10.83		LCH	15.16
IR78-GW32-2	PDB	9/27/2011	75	4	64-75	27.11	27.28	11.7		MCH	15.41
IR78-GW32-3	PDB	9/27/2011	150	4	140-150	26.30	26.85	11.8		LCH	14.50
IR78-GW34	PDB	9/16/2011	13	4	3-13	32.66	29.90	6.94		Surficial	25.72
IR78-GW35	PDB	9/16/2011	20	4	10-20	32.08	29.20	13.69		Surficial	18.39
IR78-GW36	PDB	9/14/2011	18	4	8-18	29.68	26.90	12.50		Surficial	17.18
IR78-GW37	PDB	9/14/2011	14	4	4-14	20.02	18.20	7.90		Surficial	12.12
IR78-GW39	PDB	9/17/2011	20	4	10-20	19.44	18.36	15.05		Surficial	4.39
IR78-GW40	PDB	9/15/2011	25	2	4-24	31.34	30.26	10.90		Surficial	20.44
IR78-GW42	PDB	9/15/2011	23	2	3-23	28.52	NA	18.06		Surficial	10.46
IR78-GW43	PDB	9/15/2011	30	1	25-30	29.94	30.20	10.49		Surficial	19.45
IR78-GW44	PDB	9/16/2011	31	1	26-31	30.25	30.50	10.77		UCH	19.48
IR78-GW45R	PDB	9/15/2011	22	2	11.5-21.5	27.65	27.82	8.52		Surficial	19.13
IR78-GW46	PDB	9/15/2011	23	1	18-23	30.51	30.70	10.20	1	Surficial	20.31
IR78-GW47	PDB	9/15/2011	30	2	25-30	29.76	30.10	9.82	-	Surficial	19.94
IR78-GW48	PDB	9/16/2011	23	1	18-23	29.21	29.40	8.72	1	Surficial	20.49
IR78-GW49	Could not locate	NA	31	1	26-31	NA	NA	NA		UCH	NA
IR78-GW50	PDB	9/15/2011	23	1	18-23	29.32	29.57	18.08		Surficial	11.24
IR78-GW51R	PDB	9/15/2011	21	2	11-21	27.59	NA	17.15	1	Surficial	10.44
IR78-GW52R	PDB	9/15/2011	32	2	27-32	25.60	25.90	15.25		UCH	10.35
IR78-GW53R	PDB	9/15/2011	25	2	15-25	26.38	26.60	15.98		Surficial	10.40
IR78-GW54R	PDB	9/14/2011	25	2	15-25	28.50	28.90	18.72	1	Surficial	9.78
IR78-GW55	DRY WELL	NA	24	1	18.5	29.13	NA	DRY		Surficial	5.63
IR78-GW56	PDB	9/14/2011	30	1	25-30	29.21	29.51			Surficial	
IR78-GW57	PDB	9/15/2011	28	1	23-28	29.33	29.58	18.41		Surficial	10.92
IR78-GW58R	PDB	not sampled	25	2	15-25	26.39	NA	17.71	15.33	Surficial	10.72
IR78-GW59	PDB	9/14/2011	25	1	20	28.11	28.38	17.52		Surficial	10.59
IR78-GW60	PDB	9/15/2011	30	1	25-30	26.84	27.10	13.3		Surficial	13.54
IR78-GW62	Could not locate	NA	30	1	25-30	25.62	25.81	NA		Surficial	NA
IR78-GW63	PDB	9/14/2011	29	1	24-29	27.97	28.17	18.68		Surficial	9.29
IR78-GW64	PDB	9/14/2011	28	1	23-28	26.90	27.13	17.71		Surficial	9.19

TABLE 2
Groundwater Sampling Summary
Site 78 Technical Memorandum

Well ID	Sampling Method	Sample Date	Total Depth (ft bgs)	Diameter (in)	Screened Interval (ft bgs)	TOC Elevation (ft msl)	Ground Surface Elevation (ft msl)	Depth to Water (ft BTOC)	Depth to Product	Aquifer	Groundwater Elevation (ft msl)
IR78-GW65	PDB	9/14/2011	32	1	27-32	27.91	28.12	18.32		UCH	9.59
IR78-GW66	PDB	9/14/2011	30	1	24.5-29.5	27.28	27.48	17.27		Surficial	10.01
IR78-GW67	Could not locate	NA	33	1	27.5	29.28	29.51	NA		UCH	NA
IR78-GW68	PDB	9/14/2011	28	1	23-28	28.03	28.24	17.83		Surficial	10.20
IR78-GW71	Low-Flow	9/13/2011	38	0.75	33-38	30.05	30.05	10.40		UCH	19.65
IR78-GW72	Low-Flow	9/12/2011	38	0.75	33-38	29.90	29.90	10.25		UCH	19.65
IR78-GW73	Low-Flow	9/12/2011	25	0.75	25-30	25.66	25.66	11.71		Surficial	13.95
IR78-GW74	Low-Flow	9/12/2011	43	0.75	38-43	25.58	25.58	12.75		UCH	12.83
IR78-GW75-1	Low-Flow	9/13/2011	33	0.75	28-33	25.47	25.47	12.57	-	Surficial	12.90
IR78-GW75-2	Low-Flow	9/13/2011	43	0.75	38-43	25.09	25.31	12.45		UCH	12.64
IR78-GW76	Low-Flow	9/12/2011	23	0.75	18-23	25.74	25.74	11.99	-	Surficial	13.75
IR78-GW77	Low-Flow	9/12/2011	43	0.75	38-43	26.66	26.66	13.87	-	UCH	12.79
IR78-GW79IW	PDB	9/17/2011	60	2	50-60	22.71	22.94	11.48		UCH	11.23
IR78-GW80DW	PDB	9/17/2011	80	2	70-80	22.74	22.96	11.95		MCH	10.79
IR78-GW80IW	PDB	9/17/2011	60	2	50-60	22.50	22.95	10.01		UCH	12.49
IR78-GW81DW	PDB	9/16/2011	80	2	70-80	21.02	21.36	10.12		MCH	10.90
IR78-GW81IW	PDB	9/16/2011	60	2	50-60	20.95	21.20	9.94		UCH	11.01
IR78-GW82IW	PDB	9/17/2011	60	2	50-60	23.17	23.43	13.02		UCH	10.15
IR78-GW83IW	PDB	9/16/2011	60	2	50-60	19.21	19.54	9.63		UCH	9.58
IR78-GW84IW	PDB	9/13/2011	60	2	50-60	28.89	29.09	10.42		UCH	18.47
IR78-GW85	PDB	9/15/2011	20	2	7-17	29.87	27.12	7.89		Surficial	21.98
IR78-GW85IW	PDB	9/15/2011	60	2	50-60	29.74	26.58	11.58		UCH	18.16
IR78-GW86DW	PDB	9/17/2011	100	2	95-100	28.24	28.49	17.74		MCH	10.50
IR78-GW87MCH	PDB	9/16/2011	80	2	70-80	28.89	29.03	11.40		MCH	17.49
IR78-GW88UCH	PDB	9/15/2011	40	2	30-40	28.81	28.96	10.07		UCH	18.74
IR78-GW89MCH	PDB	9/16/2011	70	2	60-70	30.39	27.12	14.60	-	MCH	15.79
IR78-GW90MCH	PDB	9/16/2011	110	2	100-110	30.67	27.14	14.40	-	MCH	16.27
IR78-GW91LCH	PDB	9/16/2011	150	2	140-150	30.37	27.30	14.60		LCH	15.77
IR78-GW92MCH	PDB	9/16/2011	70	2	60-70	31.33	27.72	15.60		MCH	15.73
IR78-GW93MCH	PDB	9/16/2011	110	2	100-110	31.32	27.74	15.60		MCH	15.72
IR78-GW94LCH	PDB	9/16/2011	150	2	140-150	31.30	27.65	15.60		LCH	15.70
IR78-GW95MCH	PDB	9/16/2011	70	2	60-70	31.90	28.19	16.15	-	MCH	15.75

TABLE 2
Groundwater Sampling Summary
Site 78 Technical Memorandum

Well ID	Sampling Method	Sample Date	Total Depth (ft bgs)	Diameter (in)	Screened Interval (ft bgs)	TOC Elevation (ft msl)	Ground Surface Elevation (ft msl)	Depth to Water (ft BTOC)	Depth to Product	Aquifer	Groundwater Elevation (ft msl)
IR78-GW96MCH	PDB	9/16/2011	110	2	100-110	31.85	28.40	16.17		MCH	15.68
IR78-GW97LCH	PDB	9/16/2011	150	2	140-150	31.88	28.33	16.25		LCH	15.63
IR78-GW98MCH	PDB	9/16/2011	90	2	80-90	28.57	28.77	12.8		MCH	15.77
IR78-GW99MCH	PDB	9/15/2011	80	2	70-80	28.09	28.30	9.30		MCH	18.79
IR78-GW100MCH	PDB	9/16/2011	70	2	60-70	33.39	30.00	17.30		MCH	16.09
IR78-GW101MCH	PDB	9/16/2011	70	2	60-70	31.62	28.69	13.60		MCH	18.02
IR78-GW102MCH	PDB	9/16/2011	70	2	60-70	27.59	25.17	13.41		MCH	14.18
IR78-GW103MCH	PDB	9/16/2011	110	2	100-110	27.72	25.19	14.00		MCH	13.72
IR78-GW104LCH	PDB	9/16/2011	150	2	140-150	27.60	25.14	14.80		LCH	12.80
IR78-GW105MCH	PDB	9/16/2011	80	2	70-80	24.16	24.40	12.60		MCH	11.56
IR78-GW106MCH	PDB	9/16/2011	110	2	100-110	24.12	24.37	12.55		MCH	11.57
IR78-GW107	PDB	9/15/2011	30	2	20-30	27.63	27.93	17.56		Surficial	10.07
IR78-GW108UCH	PDB	9/15/2011	60	2	50-60	27.79	27.85	17.75		UCH	10.04
IR78-GW109UCH	PDB	9/15/2011	60	2	50-60	26.63	26.75	16.11		UCH	10.52
IR78-GW110MCH	PDB	9/14/2011	90	2	80-90	26.83	27.24	19.35		MCH	7.48
IR78-GW111MCH	PDB	9/14/2011	90	2	80-90	25.97	25.81	17.76		MCH	8.21
IR78-GW112MCH	PDB	9/14/2011	90	2	80-90	29.88	26.68	21.56		MCH	8.32
IR78-GW113	PDB	5/22/2012	25	2	15-25	29.19	29.27	11.42*		Surficial	17.77
IR78-GW114	Low-Flow	5/23/2012	20	2	10-20	30.51	27.45	14.95*		Surficial	15.56
IR78-GW115	PDB	5/24/2012	25	2	15-25	28.19	28.34	5.88*		Surficial	22.31
IR78-GW116MCH	Low-Flow	3/30/2012	110	2	105-110	29.74	26.80	15.30*		MCH	14.44
IR78-GW117UCH	Low-Flow	5/24/2012	60	2	50-60	29.76	26.81	14.57*		UCH	15.19
IR78-GW121UCH	Low-Flow	4/5/2012	60	2	50-60	26.31	26.59	16.86*	1	UCH	9.45
IR78-GW122UCH ²	PDB	5/22/2012	60	2	50-60	25.91	26.18	16.76*		UCH	9.15
IR78-GW123UCH	PDB	5/22/2012	60	2	50-60	25.86	26.19	16.70*		UCH	9.16
IR78-GW124UCH ²	PDB	5/22/2012	60	2	50-60	25.96	26.16	16.78*		UCH	9.18
IR78-GW125MCH ²	PDB	5/24/2012	90	2	80-90	29.98	27.61	15.59		MCH	14.39
IR78-GW126MCH	PDB	5/24/2012	90	2	80-90	30.13	27.10	15.71*		MCH	14.42
IR78-GW127MCH ²	PDB	5/24/2012	90	2	80-90	30.15	27.21	15.71*		MCH	14.44
IR78-GW128MCH	PDB	5/22/2012	105	2	100-105	26.19	26.57	17.03*		MCH	9.16
IR78-GW129LCH	PDB	11/15/2012	150	2	145-150	26.56	26.85	15.92*		LCH	10.64
IR78-GWXXMCH	Low-Flow	5/24/2012	77	2	NA	NA	NA	14.37*		MCH	NA

TABLE 2
Groundwater Sampling Summary
Site 78 Technical Memorandum

Well ID	Sampling Method	Sample Date	Total Depth (ft bgs)	Diameter (in)	Screened Interval (ft bgs)	TOC Elevation (ft msl)	Ground Surface Elevation (ft msl)	Depth to Water (ft BTOC)	Depth to Product	Aquifer	Groundwater Elevation (ft msl)
IR78-MWVI01	PDB	9/13/2011	13	2	3-13	NA	NA	5.64		Surficial	NA
IR78-RW02	Not Sampled	NA	35	6	25-35	NA	NA	19.18		UCH	NA
IR78-RW03	PDB	9/16/2011	35	6	25-35	NA	NA	10.30		UCH	NA
IR78-RW04	PDB	9/16/2011	35	6	25-35	NA	NA			UCH	NA
IR78-RW05	Low-Flow	9/14/2011	35	6	25-35	25.63	NA	14.62		UCH	11.01
IR78-RW06	Not Sampled	NA	35	6	25-35	NA	NA	NA		Surficial	NA
IR78-RW07	PDB	9/13/2011	35	6	25-35	24.77	NA	13.50		UCH	11.27
IR78-RW08	Not Sampled	NA	35	6	25-35	NA	NA	NA		Surficial	NA
IR78-RW09R	PDB	9/14/2011	25	2	15-25	25.91	26.21	15.98		UCH	9.93
IR78-RW10	Sample Port	9/13/2011	35	6	25-35	25.84	NA	6.70		UCH	19.14
IR78-RW11	Sample Port	9/13/2011	35	6	25-35	25.53	NA	7.00		UCH	18.53
IR78-RW12	Sample Port	9/13/2011	35	6	25-35	26.37	NA	7.54		UCH	18.83
IR78-RW13	Sample Port	9/16/2011	35	6	25-35	NA	NA			UCH	NA
IR78-RW14	Sample Port	9/16/2011	35	6	25-35	24.90	NA	18.16		UCH	6.74
IR78-RW15	Sample Port	9/13/2011	35	6	25-35	21.81	23.64	23.61		UCH	-1.80

Notes:

NA = Information not Available

IR78- GWXXMCH represents an unidentifed well encountered during the Phase III investigation

^{* -} Groundwater elevations were measured in 2012 and not included in the potentiometric surface maps, which were generated using data from 2011.

¹ - PDB not deployed due to silt filling screened interval

² - Well sampled as part of Treatability Study. Data not included in Expanded Groundwater Investigation

TABLE 3

Groundwater Analytical Data - Site 78 North

Site 78 Technical Memorandum

Station ID		IR78-GW22	IR78-	GW22-1	IR78-GW23	IR78-GW24-1	IR78-GW24-2	IR78-GW24-3	IR78-	GW25	IR78-GW26	IR78-GW30-2
Sample ID	NCGWQS/MCL (April, 2013)	IR78-GW22-11C	IR78-GW22-1-11C	IR78-GW22-1D-11C	IR78-GW23-11C	IR78-GW24-1-11C	IR78-GW24-2-11C	IR78-GW24-3-11C	IR78-GW25-11C	IR78-GW25D-11C	IR78-GW26-11C	IR78-GW30-2-11C
Sample Date		09/16/11	09/18/11	09/18/11	09/15/11	09/13/11	09/13/11	09/13/11	09/15/11	09/15/11	09/16/11	09/16/11
Groundwater Investigation Event		Confirmatory	Confi	rmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confir	matory	Confirmatory	Confirmatory
Chemical Name												
Volatile Organic Compounds (μg/l)												
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	81	76	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	2 U	2 U	2 U	20	110	2 U	2 U	2 U	2 U	2 U	2 U
Benzene	1	1 U	53	49	2.1	1 U	1 U	1 U	1 U	1 U	1 U	8.6
cis-1,2-Dichloroethene	70	1 U	1 U	1 U	19	110	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	600	1 U	1	1.2	1.1	1 U	1 U	1 U	1 U	1 U	1 U	6.6
Isopropylbenzene	70	1 U	1 U	1 U	0.81 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	9	9.6	2 U	2 U	2 U	2 U	2 U	2 U	2 U	8.4
Methylene Chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	6.5	7.4	3.9	1 U	1 U	1 U	1 U	1 U	1 U	4.1
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	1 U	17	17	0.83 J	1 U	1.2	1 U	1 U	1 U	1 U	12
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1.4	3.8	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	3	1 U	1 U	1 U	1 U	3.3	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	1 U	1 U	1 U	6	2.5	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	500	3 U	16	17	4.4	3 U	3 U	3 U	3 U	3 U	3 U	12

Notos

Bold box indicates exceedance of NCGWQS or the more conservative MCL

U - Not detected

^{* -} The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

^{**}Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

TABLE 3

Groundwater Analytical Data - Site 78 North

Site 78 Technical Memorandum

Station ID	NCGWQS/MCL (April, 2013)	IR78-GW30-3	IR78-GW34	IR78-GW35	IR78-GW40	IR78-GW43	IR78-GW44	IR78-GW45R	IR78-GW46	IR78-GW47	IR78-GW48	IR78-GW71
Sample ID		IR78-GW30-3-11C	IR78-GW34-11C	IR78-GW35-11C	IR78-GW40-11C	IR78-GW43-11C	IR78-GW44-11C	IR78-GW45R-11C	IR78-GW46-11C	IR78-GW47-11C	IR78-GW48-11C	IR78-GW71-11C
Sample Date		09/16/11	09/16/11	09/16/11	09/15/11	09/15/11	09/16/11	09/15/11	09/15/11	09/15/11	09/16/11	09/13/11
Groundwater Investigation Event		Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory
Chemical Name												
Volatile Organic Compounds (μg/l)												
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.1
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	2 U	2 U	2 U	2 U	120	250	2 U	1.5 J	1.6 J	2 U	430
Benzene	1	1.7	1 U	1 U	1 U	1.4	1 U	1 U	8	2.7	1 U	1.1
cis-1,2-Dichloroethene	70	1 U	1 U	1 U	1 U	120	250	1 U	1.5	1.6	1 U	420
Ethylbenzene	600	1 U	1 U	1 U	1 U	1.6	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	7.3	2 U	2 U	2 U	2 U	2 U	2 U
Methylene Chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	1 U	1 U	1 U	3.3	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	1.1	1 U	1 U	1 U	5.5	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1 U	3.9	3.1	1 U	1 U	1 U	1 U	8.4
Trichloroethene	3	1 U	1 U	1 U	1 U	0.97 J	1.8	1 U	1 U	12	1 U	15
Vinyl chloride	0.03	3	1 U	1 U	1 U	56	110	1 U	1 U	1 U	1 U	250
Xylene, total	500	3 U	3 U	3 U	3 U	11	3 U	3 U	3 U	3 U	3 U	3 U

Notos

Bold box indicates exceedance of NCGWQS or the more conservative MCL

J - Analyte present, value may or may not be accurate or precise

U - Not detected

^{* -} The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

^{**}Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

TABLE 3

Groundwater Analytical Data - Site 78 North

Site 78 Technical Memorandum

Station ID	NCGWQS/MCL (April, 2013)	IR78-GW72	IR78-GW79IW	IR78-GW80DW	IR78-G	W80IW	IR78-GW81DW	IR78-GW81IW	IR78-GW82IW	IR78-GW84IW	IR78-GW85IW
Sample ID		IR78-GW72-11C	IR78-GW79IW-11C	IR78-GW80DW-11C	IR78-GW80IW-11C	IR78-GW80IWD-11C	IR78-GW81DW-11C	IR78-GW81IW-11C	IR78-GW82IW-11C	IR78-GW84IW-11C	IR78-GW85IW-11C
Sample Date		09/12/11	09/17/11	09/17/11	09/17/11	09/17/11	09/16/11	09/16/11	09/17/11	09/13/11	09/15/11
Groundwater Investigation Event		Confirmatory	Confirmatory	Confirmatory	Confirmatory		Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory
Chemical Name											
Volatile Organic Compounds (μg/l)											
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	1 U	7.8	13	13	1 U	1 U	1 U	1 U	0.5 J
1,2-Dichloroethene (total)**	60	180	2 U	1.4 J	1.3 J	1.3 J	2 U	2 U	2 U	57	2 U
Benzene	1	1.3	6.4	59	180	180	1 U	1 U	4.3	0.77 J	1.4
cis-1,2-Dichloroethene	70	180	0.67 J	1.4	1.3	1.3	1 U	1 U	1 U	56	0.95 J
Ethylbenzene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene Chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	5.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	3	1.9	1 U	1 U	2.1	2	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	110	1 U	1 U	1 U	1 U	1 U	1 U	1 U	10	1 U
Xylene, total	500	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

U - Not detected

^{* -} The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

^{**}Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

TABLE 3

Groundwater Analytical Data - Site 78 North

Site 78 Technical Memorandum

Station ID		IR78-GW85	IR78-GW87MCH	IR78-G\	W88UCH	IR78-GW89MCH	IR78-GW90MCH	IR78-GW91LCH	IR78-GW92MCH	IR78-GW93MCH
Sample ID	NCGWQS/MCL (April, 2013)	IR78-GW85-11C	IR78-GW87MCH-11C	IR78-GW88UCH-11C	IR78-GW88UCHD-11C	IR78-GW89MCH-11C	IR78-GW90MCH-11C	IR78-GW91LCH-11C	IR78-GW92MCH-11C	IR78-GW93MCH-11C
Sample Date		09/15/11	09/16/11	09/15/11	09/15/11	09/16/11	09/16/11	09/16/11	09/16/11	09/16/11
Groundwater Investigation Event		Confirmatory	Confirmatory	Confirmatory		Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory
Chemical Name										
Volatile Organic Compounds (μg/l)										
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1.6	1.7	1 U	15 J	1 U	1.1	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	7.7 J	1 U	6.9	1 U
1,2-Dichloroethene (total)**	60	2 U	1.4 J	46	42	300	8,900	2 U	61	86
Benzene	1	1 U	1	5.3	4.8	1 U	5.3 J	1 U	130	1 U
cis-1,2-Dichloroethene	70	1 U	1.4	39	35	200	6,700	1 U	50	86
Ethylbenzene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.1	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene Chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	9.6	5 U	5 U
o-Xylene	500	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	6.3	140 J	1 U	0.76 J	1 U
Toluene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	7.5	6.9	100	2,200	1 U	11	1 U
Trichloroethene	3	1 U	1 U	1 U	1 U	150	9,500	1 U	35	1 U
Vinyl chloride	0.03	1 U	23	39	37	0.92 J	110 J	1 U	15	0.78 J
Xylene, total	500	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Notos

Bold box indicates exceedance of NCGWQS or the more conservative MCL

J - Analyte present, value may or may not be accurate or precise

U - Not detected

^{* -} The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

^{**}Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

TABLE 3

Groundwater Analytical Data - Site 78 North

Site 78 Technical Memorandum

Station ID		IR78-GW94LCH	IR78-GW95MCH	IR78-GW96MCH	IR78-GW97LCH	IR78-0	GW98MCH	IR78-GW99MCH	IR78-GW100MCH	IR78-GW101MCH
Sample ID	NCGWQS/MCL (April, 2013)	IR78-GW94LCH-11C	IR78-GW95MCH-11C	IR78-GW96MCH-11C	IR78-GW97LCH-11C	IR78-GW98MCH-11C	IR78-GW98MCHD-11C	IR78-GW99MCH-11C	IR78-GW100MCH-11C	IR78-GW101MCH-11C
Sample Date		09/16/11	09/16/11	09/16/11	09/16/11	09/16/11	09/16/11	09/15/11	09/16/11	09/16/11
Groundwater Investigation Event		Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory		Confirmatory	Confirmatory	Confirmatory
Chemical Name										
Valatila Organia Compounda (ug/l)										
Volatile Organic Compounds (μg/l) 1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	1.2 J
Benzene	1	0.85 J	1 U	1 U	1 U	1 U	1 U	1 U	32	1 U
cis-1,2-Dichloroethene	70	1 U	1 U	1 U	1 U	0.76 J	0.67 J	1 U	1 U	1.2
Ethylbenzene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	10	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	2 U	2 U	2 U	6.5	2 U
Methylene Chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5.6	1 U
Tetrachloroethene	0.7	1 U	1 U	0.99 J	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	16	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	3	0.64 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	1 U	1 U	1 U	1 U	1 U	1 U	1 U	95	1 U
Xylene, total	500	3 U	3 U	3 U	3 U	3 U	3 U	3 U	12	3 U

Notes:

Bold box indicates exceedance of NCGWQS or the more conservative MCL

U - Not detected

^{* -} The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

^{**}Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

TABLE 3

Groundwater Analytical Data - Site 78 North

Site 78 Technical Memorandum

Station ID	Necovos (Nec	IR78-GW102MCH	IR78-GW103MCH	IR78-GW104LCH	IR78-	MWVI01	IR78-RW03	IR78-RW04	IR78-RW10	IR78-RW11	IR78-	GW113
Sample ID	NCGWQS/MCL (April, 2013)	IR78-GW102MCH-11C	IR78-GW103MCH-11C	IR78-GW104LCH-11C	IR78-MWVI01-11C	IR78-MWVI01-D-11C	IR78-RW03-11C	IR78-RW04-11C	IR78-RW10-11C	IR78-RW11-11C	IR78-GW113-12B	IR78-GW113D-12B
Sample Date		09/16/11	09/16/11	09/16/11	09/13/11	09/13/11	09/16/11	09/16/11	09/13/11	09/13/11	05/22/12	05/22/12
Groundwater Investigation Event		Confirmatory	Confirmatory	Confirmatory	Conf	irmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Add	litional
Chemical Name												
Volatile Organic Compounds (μg/l)												
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
1,2-Dichloroethene (total)**	60	2 U	2 U	2 U	84	89	2 U	2 U	1.3 J	110	20	19
Benzene	1	1 U	1 U	1 U	2.2	2.3	1 U	1 U	4.6	1.2 J	1 U	1 U
cis-1,2-Dichloroethene	70	1 U	0.51 J	1 U	82	87	1 U	1 U	1.3	100	20	19
Ethylbenzene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	4 U	2 U	2 U
Methylene Chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	10 U	5 U	5 U
o-Xylene	500	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
Toluene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1.9	2.3	1 U	1 U	1 U	3.1	1 U	1 U
Trichloroethene	3	1 U	1 U	1 U	2.9	3	1 U	1 U	0.56 J	1.5 J	1.7 J	1.5 J
Vinyl chloride	0.03	1 U	1 U	1 U	25	25	1 U	1 U	1 U	240	1 U	1 U
Xylene, total	500	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	6 U	3 U	3 U

Bold box indicates exceedance of NCGWQS or the more conservative MCL

J - Analyte present, value may or may not be accurate or precise

U - Not detected

^{* -} The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

^{**}Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

TABLE 3

Groundwater Analytical Data - Site 78 North

Site 78 Technical Memorandum

Station ID	NGCWGC (NGC	IR78-GW114	IR78-GW115	IR78-GV	V116MCH	IR78-GW117UCH	IR78-GW126MCH	IR78-GWXXMCH	IR78-GW125MCH	IR78-GW127MCH
Sample ID	NCGWQS/MCL (April, 2013)	IR78-GW114-12B	IR78-GW115-12B	IR78-GW116MCH-12A	IR78-GW116MCHD-12A	IR78-GW117UCH-12B	IR78-GW126MCH-12B	IR78-GWXXMCH-12B	IR78-GW125MCH-12B	IR78-GW127MCH-12B
Sample Date		05/23/12	05/24/12	03/30/12	03/30/12	05/24/12	05/24/12	05/24/12	05/24/12	05/24/12
Groundwater Investigation Event		Additional	Additional	Add	itional	Additional	Additional	Additional	Treatability Study	Treatability Study
Chemical Name										
Volatile Organic Compounds (μg/l)										
1,1-Dichloroethane	6	1 U	1 U	5.7 U	5.7 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	4.9 J	12 J	1 U	2.1	1 U	3	1.5 J
1,2-Dichloroethane	0.4	1 U	1 U	5.7 U	5.7 U	1 U	1 U	1 U	0.64 J	1 U
1,2-Dichloroethene (total)**	60	5	1 U	860	810	9.5	380 D	1 U	980 D	330 D
Benzene	1	1 U	1 U	5.7 U	5.7 U	1 U	0.88 J	2.4	1.5 J	0.9 J
cis-1,2-Dichloroethene	70	2.2	1 U	710	670	9	320 D	1 U	790 D	250 D
Ethylbenzene	600	1 U	1 U	5.7 U	5.7 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	5.7 U	5.7 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	11 U	11 U	2 U	2 U	2 U	2 J	2 U
Methylene Chloride	5	5 U	5 U	34 U	30 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	1 U	5.7 U	5.7 U	1 U	0.65 J	1 U	3	1 U
Tetrachloroethene	0.7	14	1 U	47	44	1 U	89	1 U	190 D	68
Toluene	600	1 U	1 U	13 J	8.7 U	1 U	1 U	2.3	1 U	1 U
trans-1,2-Dichloroethene	100	2.8	1 U	150	140	1 U	73	1 U	190 D	81
Trichloroethene	3	9.5	1 U	2,700	2,500	23	1,100 D	1 U	1,900 D	1,100 D
Vinyl chloride	0.03	1 U	1 U	25 J	21 J	1.7 J	14	7.6	27	10
Xylene, total	500	3 U	3 U	5.7 U	5.7 U	3 U	3 U	3 U	5	3 U

Bold box indicates exceedance of NCGWQS or the more conservative MCL

U - Not detected

^{* -} The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

^{**}Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

TABLE 4

Groundwater Analytical Data - Site 78 South

Site 78 Technical Memorandum

Station ID	NCGWQS/MCL	IR78-GW01	IR78-GW02	IR78-GW03	IR78-GW04-1	IR78-GW04-2	IR78-GW05	IR78-GW08	IR78-0	W09-1	IR78-0	W09-3
Sample ID	(April, 2013)	IR78-GW01-11C	IR78-GW02-11C	IR78-GW03-11C	IR78-GW04-1-11C	IR78-GW04-2-11C	IR78-GW05-11C	IR78-GW08-11C	IR78-GW09-1-11C	IR78-GW09-1-12B*	IR78-GW09-3-11C	IR78-GW09-3D-11C
Sample Date		09/15/11	09/15/11	09/14/11	09/14/11	09/14/11	09/15/11	09/16/11	09/12/11	05/22/12	09/12/11	09/12/11
Groundwater Investigation Event		Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Treatability Study	Confir	matory
Chemical Name												
Volatile Organic Compounds (μg/l)												
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	5.6	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.93 J	2 U	2 U
Benzene	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	5.1	1 U	1 U	1 U	1 U	1 U	1 U	0.75 J	0.93 J	1 U	1 U
Ethylbenzene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	3	9	1 U	1 U	1 U	1 U	1 U	1 U	40	44	1 U	1 U
Vinyl chloride	0.03	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	500	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Bold box indicates exceedance of NCGWQS or the more conservative MCL

U - Not detected

^{* -} The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is

^{**}Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

TABLE 4

Groundwater Analytical Data - Site 78 South

Site 78 Technical Memorandum

Station ID	NCGWQS/MCL	IR78-GW10	IR78-GW11	IR78-GW12	IR78-GW13	IR78-GW14	IR78-GW16	IR78-GW17-1	IR78-GW17-2	IR78-GW17-4	IR78	3-GW20
Sample ID	(April, 2013)	IR78-GW10-11C	IR78-GW11-11C	IR78-GW12-11C	IR78-GW13-11C	IR78-GW14-11C	IR78-GW16-11C	IR78-GW17-1-11C	IR78-GW17-2-11C	IR78-GW17-4-11C	IR78-GW20-11C	IR78-GW20D-11C
Sample Date		09/15/11	09/15/11	09/14/11	09/17/11	09/16/11	09/16/11	09/16/11	09/16/11	09/17/11	09/16/11	09/16/11
Groundwater Investigation Event		Confirmatory	Confirmatory	Confirmatory	Confi	rmatory						
Chemical Name												
Volatile Organic Compounds (μg/l)												
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.4	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Benzene	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	500	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Bold box indicates exceedance of NCGWQS or the more conservative MCL

U - Not detected

^{* -} The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

^{**}Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

TABLE 4

Groundwater Analytical Data - Site 78 South

Site 78 Technical Memorandum

Station ID	NCGWQS/MCL	IR78-GW21	IR78-	GW29	IR78-GW31-2	IR78-GW31-3	IR78-GW32-2	IR78-0	GW32-3	IR78	-GW36	IR78-GW37
Sample ID	(April, 2013)	IR78-GW21-11C	IR78-GW29-11C	IR78-GW29D-11C	IR78-GW31-2-11C	IR78-GW31-3-11C	IR78-GW32-2-11C	IR78-GW32-3-11C	IR78-GW32-3D-11C	IR78-GW36-11C	IR78-GW36D-11C	IR78-GW37-11C
Sample Date		09/17/11	09/14/11	09/14/11	09/15/11	09/15/11	09/27/11	09/27/11	09/27/11	09/14/11	09/14/11	09/14/11
Groundwater Investigation Event		Confirmatory	Confir	matory	Confirmatory	Confirmatory	Confirmatory	Confi	matory	Confi	rmatory	Confirmatory
Chemical Name												
Volatile Organic Compounds (μg/l)												
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Benzene	1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	500	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Bold box indicates exceedance of NCGWQS or the more conservative MCL

U - Not detected

^{* -} The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

^{**}Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

TABLE 4

Groundwater Analytical Data - Site 78 South

Site 78 Technical Memorandum

Station ID	NCGWQS/MCL	IR78-GW39	IR78-GW42	IR78-GW50	IR78-GW51R	IR78-GW52R	IR78-GW53R	IR78-GW54R	IR78-GW56	IR78-GW57	IR78-GW59
Sample ID	(April, 2013)	IR78-GW39-11C	IR78-GW42-11C	IR78-GW50-11C	IR78-GW51R-11C	IR78-GW52R-11C	IR78-GW53R-11C	IR78-GW54R-11C	IR78-GW56-11C	IR78-GW57-11C	IR78-GW59-11C
Sample Date		09/17/11	09/15/11	09/15/11	09/15/11	09/15/11	09/15/11	09/14/11	09/14/11	09/15/11	09/14/11
Groundwater Investigation Event		Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory
Chemical Name											
Volatile Organic Compounds (μg/l)				i							
1,1-Dichloroethane	6	1 U	120	1 U	1 U	1.2	2 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	14	1 U	1 U	0.94 J	2 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	2 U	500	2 U	2 U	81	4 U	2.4	2 U	2 U	3.1
Benzene	1	1 U	2.6	1 U	1 U	9.1	220	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	1 U	500	1 U	1 U	81	2 U	2.4	0.77 J	0.57 J	3.1
Ethylbenzene	600	1 U	1 U	1 U	1 U	60	52	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	4.7	2 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	24	37	2 U	2 U	2 U	2 U
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	0.95 J	1 U	1 U	9.7	17	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U
Toluene	600	1 U	2.5	1 U	1 U	6.7	110	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	1 U	2.1	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U
Trichloroethene	3	1 U	8.1	1 U	1 U	1 U	2 U	1 U	1.2	1 U	1 U
Vinyl chloride	0.03	1 U	140	1 U	1 U	180	2 U	1.2	1 U	0.78 J	1.4
Xylene, total	500	3 U	3 U	3 U	3 U	34	54	3 U	3 U	3 U	3 U

Bold box indicates exceedance of NCGWQS or the more conservative MCL

U - Not detected

^{* -} The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

^{**}Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

TABLE 4

Groundwater Analytical Data - Site 78 South

Site 78 Technical Memorandum

Station ID	NCGWQS/MCL	IR78-0	GW60	IR78-GW63	IR78-GW64	IR78-GW65	IR78-GW66	IR78-GW68	IR78-GW73	IR78-GW74
Sample ID	(April, 2013)	IR78-GW60-11C	IR78-GW60-12B	IR78-GW63-11C	IR78-GW64-11C	IR78-GW65-11C	IR78-GW66-11C	IR78-GW68-11C	IR78-GW73-11C	IR78-GW74-11C
Sample Date		09/15/11	05/23/12	09/14/11	09/14/11	09/14/11	09/14/11	09/14/11	09/12/11	09/12/11
Groundwater Investigation Event		Confirmatory	Treatability Study	Confirmatory						
Chemical Name										
Volatile Organic Compounds (µg/l)										
1,1-Dichloroethane	6	1 U	3.1	1 U	1 U	1	3.2	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	1.8 J	26	17	9.6	18	1.6 J	2 U	2 U	170
Benzene	1	1 U	25 UD	1 U	1 U	1 U	1 U	1 U	1 U	100
cis-1,2-Dichloroethene	70	1.8 J	25 JD	16	9.6	17	1.6	1.1	1 U	160
Ethylbenzene	600	1,900	670 D	1 U	1 U	1 U	1 U	1 U	1 U	1,200
Isopropylbenzene	70	160 J	26 JD	1 U	1 U	1 U	1 U	1 U	3.9	79
m- and p-Xylene	500	6,000	1,700 D	2 U	2 U	2 U	2 U	2 U	2 U	3,600
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	2,100	930 D	1 U	1 U	1 U	1 U	1 U	1 U	1,400
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	10	2.9
Toluene	600	210	56 D	1 U	1 U	1 U	1 U	1 U	1 U	2,200
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	3	420	170	2	1.4	0.9 J	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	1 U	1 U	1 U	1 U	2.1	41	1 U	1 U	1 U
Xylene, total	500	8,200	2,700 D	3 U	3 U	3 U	3 U	3 U	3 U	5,000

Bold box indicates exceedance of NCGWQS or the more conservative MCL

U - Not detected

^{* -} The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

^{**}Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

TABLE 4

Groundwater Analytical Data - Site 78 South

Site 78 Technical Memorandum

Station ID	NCGWQS/MCL		IR78-GW75-1		IR78-GW75-2	IR78	-GW76	IR78-GW77	IR78-GW83IW	IR78-GW86DW	IR78-GW105MCH
Sample ID	(April, 2013)	IR78-GW75-1-11C	IR78-GW75-1D-11C	IR78-GW75-1-12B	IR78-GW75-2-11C	IR78-GW76-11C	IR78-GW76-12B	IR78-GW77-11C	IR78-GW83IW-11C	IR78-GW86DW-11C	IR78-GW105MCH-11C
Sample Date		09/13/11	09/13/11	05/23/12	09/13/11	09/12/11	05/23/12	09/12/11	09/16/11	09/17/11	09/16/11
Groundwater Investigation Event		Confi	rmatory	Treatability Study	Confirmatory	Confirmatory	Treatability Study	Confirmatory	Confirmatory	Confirmatory	Confirmatory
Chemical Name											
Volatile Organic Compounds (μg/l)											
1,1-Dichloroethane	6	1 U	1 U	1 U	10 U	1 U	1 U	20 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	10 U	1 U	1 U	20 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	10 U	1 U	1 U	20 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	130	110	62	160	350	430 D	40 U	2 U	2 U	15
Benzene	1	1,000	1,100	130	120	1 U	1 U	20 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	130	110	61	160	400	430 D	20 U	1 U	1 U	14
Ethylbenzene	600	990	1,100	990 D	97	200	140	1,500	1 U	1 U	1 U
Isopropylbenzene	70	80	91	37	10 U	76	69	50	1 U	1 U	1 U
m- and p-Xylene	500	3,500	3,800	3,000 D	100	1,600	1,300 D	4,200	2 U	2 U	2 U
Methylene chloride	5	5 U	5 U	5 U	50 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1,500	1,700	1,400 D	38	480	470 D	1,300	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	10 U	1.1	1 J	20 U	1 U	1 U	1 U
Toluene	600	15,000	15,000	8,400 D	570	11	6.9	2,300	1 U	0.68 J	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	10 U	3	2.6	20 U	1 U	1 U	1 U
Trichloroethene	3	1 U	1 U	1.9 J	11	420	330 D	200	1 U	1 U	28
Vinyl chloride	0.03	1.3	1.2	1.1 J	10 U	0.93 J	1.2 J	20 U	1 U	1 U	1 U
Xylene, total	500	5,100	5,400	4,400 D	140	2,100	1,800 D	5,500	3 U	3 U	3 U

Bold box indicates exceedance of NCGWQS or the more conservative MCL

U - Not detected

^{* -} The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

^{**}Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

TABLE 4

Groundwater Analytical Data - Site 78 South

Site 78 Technical Memorandum

Station ID	NCGWQS/MCL	IR78-GW106MCH	IR78-GW107	IR78-GW		IR78-GW109UCH	IR78-GW110MCH	IR78-GW111MCH	IR78-GW112MCH	IR78-RW05
Sample ID	(April, 2013)	IR78-GW106MCH-11C	IR78-GW107-11C	IR78-GW108UCH-11C	IR78-GW108UCHD-11C	IR78-GW109UCH-11C	IR78-GW110MCH-11C	IR78-GW111MCH-11C	IR78-GW112MCH-11C	IR78-RW05-11C
Sample Date		09/16/11	09/15/11	09/15/11	09/15/11	09/15/11	09/14/11	09/14/11	09/14/11	09/14/11
Groundwater Investigation Event		Confirmatory	Confirmatory	Confirm	matory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory
Chemical Name										
Volatile Organic Compounds (μg/l)										
1,1-Dichloroethane	6	1 U	2.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	7	1 U	1 U	23 J	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	2 U	68	2 U	2 U	360	2 U	2 U	5	2 U
Benzene	1	1 U	0.59 J	1 U	1 U	0.64 J	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	1 U	67	1 U	1 U	360	1 U	1 U	5	1 U
Ethylbenzene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	1 U	1.4 J	1 U	1 U	1 U	1 U
Trichloroethene	3	1 U	26	1 U	1 U	12,000	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	1 U	3.4	1 U	1 U	2.5 J	1 U	1 U	1 U	1 U
Xylene, total	500	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Bold box indicates exceedance of NCGWQS or the more conservative MCL

U - Not detected

^{* -} The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

^{**}Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

TABLE 4

Groundwater Analytical Data - Site 78 South

Site 78 Technical Memorandum

Station ID	NCGWQS/MCL	IR78-	RW07	IR78-RW09R	IR78-RW12	IR78-RW13	IR78-RW14	IR78-RW15	IR78-GW121UCH	IR78-GW123UCH	IR78-GW128MCH
Sample ID	(April, 2013)	IR78-RW07-11C	IR78-RW07D-11C	IR78-RW09R-11C	IR78-RW12-11C	IR78-RW13-11C	IR78-RW14-11C	IR78-RW15-11C	IR78-GW121UCH-12B	IR78-GW123UCH-12B	IR78-GW128MCH-12B
Sample Date		09/13/11	09/13/11	09/14/11	09/13/11	09/16/11	09/16/11	09/13/11	04/05/12	05/22/12	05/22/12
Groundwater Investigation Event		Confir	matory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Confirmatory	Additional	Additional	Additional
Chemical Name											
Volatile Organic Compounds (μg/I)											
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U	4.8	1 U	1 U	40 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	1 U	1 U	1 U	2.3	1 U	1 U	40 U	3.5	1 U
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	40 U	1 U	1 U
1,2-Dichloroethene (total)**	60	1.2 J	2 U	2 U	65	56	2 U	120	430	160	1 U
Benzene	1	1 U	1 U	1 U	4.7	13	1 U	100	40 U	1 U	1 U
cis-1,2-Dichloroethene	70	1.2	1	1 U	62	56	0.97 J	120	430	160	1 U
Ethylbenzene	600	1 U	1 U	1 U	1 U	0.83 J	1 U	180	40 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U	1 U	1 U	18	40 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	1.5 J	2 U	2 U	640	80 U	2 U	2 U
Methylene chloride	5	5 U	5 U	5 U	5 U	5 U	5 U	5 U	69 U	5 U	5 U
o-Xylene	500	0.65 J	1 U	1 U	0.75 J	0.81 J	1 U	200 J	40 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U	1 U	1 U	1	40 U	1 U	1 U
Toluene	600	1 U	1 U	1 U	1 U	0.92 J	1 U	730 J	46 U	1 U	2.3
trans-1,2-Dichloroethene	100	1 U	1 U	1 U	2.8	1 U	1 U	1 U	40 U	0.76 J	1 U
Trichloroethene	3	1 U	1 U	1 U	20	5.4	1.3	19	11,000	5,100 D	11
Vinyl chloride	0.03	1 U	1 U	1 U	7.5	45	1 U	1 U	40 U	1 U	1 U
Xylene, total	500	3 U	3 U	3 U	2.2 J	3 U	3 U	840	40 U	3 U	3 U

Bold box indicates exceedance of NCGWQS or the more conservative MCL

U - Not detected

^{* -} The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

^{**}Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

TABLE 4

Groundwater Analytical Data - Site 78 South

Site 78 Technical Memorandum

Station ID	NCGWQS/MCL	IR78-GW129LCH	IR78-G	W122UCH	IR78-GW124UCH
Sample ID	(April, 2013)	IR78-GW129LCH-12D	IR78-GW122UCH-12B	IR78-GW122UCHD-12B	IR78-GW124UCH-12B
Sample Date		11/15/12	05/22/12	05/22/12	05/22/12
Groundwater Investigation Event		Additional	Treatal	bility Study	Treatability Study
Chemical Name					
Volatile Organic Compounds (µg/l)					
1,1-Dichloroethane	6	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	1 U	3.8	3.5	3
1,2-Dichloroethane	0.4	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	1 U	170	170	140
Benzene	1	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	1 U	170	170	140
Ethylbenzene	600	1 U	1 U	1 U	1 U
Isopropylbenzene	70	1 U	1 U	1 U	1 U
m- and p-Xylene	500	2 U	2 U	2 U	2 U
Methylene chloride	5	1 U	5 U	5 U	5 U
o-Xylene	500	5 U	1 U	1 U	1 U
Tetrachloroethene	0.7	1 U	1 U	1 U	1 U
Toluene	600	1 U	1 U	1 U	1.3 J
trans-1,2-Dichloroethene	100	1 U	1.2 J	1.2 J	0.82 J
Trichloroethene	3	1 U	5,400 D	4,900 D	4,300 D
Vinyl chloride	0.03	1 U	1 U	1 U	1 U
Xylene, total	500	3 U	3 U	3 U	3 U

Bold box indicates exceedance of NCGWQS or the more conservative MCL

U - Not detected

^{* -} The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

^{**}Value reported is the NCAC 2L Interim Maximum Allowable Standard

D - Compound identified in an analysis at a secondary dilution factor

J - Analyte present, value may or may not be accurate or precise

TABLE 9
Passive Soil Gas Analytical Results
Site 78 Technical Memorandum

Station ID	IR78-SG-100	IR78-SG-101	IR78-SG-102	IR78-SG-103	IR78-SG-104	IR78-SG-105	IR78-SG-106	IR78	8-SG-107
Sample ID	IR78-SG-100-12A	IR78-SG-101-12A	IR78-SG-102-12A	IR78-SG-103-12A	IR78-SG-104-12A	IR78-SG-105-12A	IR78-SG-106-12A	IR78-SG-107-12A	IR78-SG-107 DUP-12A
Sample Date	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12
PID (ppm)	0.0	1.1	0.5	16.6	0.0	0.0	0.0		27.2
Volatile Organic Compounds (ng)									
trans-1,2-Dichloroethene	<25	<25	<25	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethene	<25	<25	<25	<25	<25	<25	<25	<25	<25
Trichloroethene	<25	<25	<25	<25	<25	<25	<25	<25	<25
Toluene	365	<25	<25	<25	109	<25	341	<25	<25
Tetrachloroethene	<25	<25	<25	<25	<25	<25	<25	<25	<25

Bold text indicates detection of an analyte

ng- nanogram

PID - photoionization detector with 10.6 eV bulb

TABLE 9
Passive Soil Gas Analytical Results
Site 78 Technical Memorandum

Station ID	IR78-SG-108	IR78-SG-109	IR78-SG-110	IR78-SG-111	IR78-SG-112	IR78	3-SG-113	IR78-SG-114
Sample ID	IR78-SG-108-12A	IR78-SG-109-12A	IR78-SG-110-12A	IR78-SG-111-12A	IR78-SG-112-12A	IR78-SG-113-12A	IR78-SG-113 DUP-12A	IR78-SG-114-12A
Sample Date	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12
PID (ppm)	10.8	NM	0.0	0.0	0.0		45.8	19.5
Volatile Organic Compounds (ng)								
trans-1,2-Dichloroethene	<25	<25	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethene	<25	<25	<25	<25	<25	<25	<25	<25
Trichloroethene	<25	<25	<25	<25	<25	<25	<25	<25
Toluene	<25	<25	<25	36	56	47	36	<25
Tetrachloroethene	<25	<25	<25	<25	<25	<25	<25	<25

Bold text indicates detection of an analyte

ng- nanogram

PID - photoionization detector with 10.6 eV

TABLE 9
Passive Soil Gas Analytical Results
Site 78 Technical Memorandum

Station ID	IR78-SG-115	IR78-SG-116	IR78-SG-117	IR78-SG-118	IR78-SG-119	IR78-SG-120	IR78-SG-121	IR78-SG-122	IR78-SG-123
Sample ID	IR78-SG-115-12A	IR78-SG-116-12A	IR78-SG-117-12A	IR78-SG-118-12A	IR78-SG-119-12A	IR78-SG-120-12A	IR78-SG-121-12A	IR78-SG-122-12A	IR78-SG-123-12A
Sample Date	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12
PID (ppm)	19.3	24.1	0.0	0.0	0.0	0.0	0.0	0.0	2.9
Volatile Organic Compounds (ng)									
trans-1,2-Dichloroethene	<25	76	<25	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethene	<25	49	<25	<25	<25	<25	<25	<25	<25
Trichloroethene	<25	2,087	<25	<25	<25	<25	<25	<25	<25
Toluene	<25	125	<25	40	<25	37	<25	45	<25
Tetrachloroethene	<25	2,212	<25	<25	<25	<25	<25	<25	<25

Bold text indicates detection of an analyte

ng- nanogram

PID - photoionization detector with 10.6 eV

TABLE 9
Passive Soil Gas Analytical Results
Site 78 Technical Memorandum

Station ID	IR78-SG-124	IR78-SG-125	IR78	3-SG-126	IR78-SG-127	IR78-SG-128	IR78-SG-129	IR78-SG-130
Sample ID	IR78-SG-124-12A	IR78-SG-125-12A	IR78-SG-126-12A	IR78-SG-126 DUP-12A	IR78-SG-127-12A	IR78-SG-128-12A	IR78-SG-129-12A	IR78-SG-130-12A
Sample Date	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12	1/5/12
PID (ppm)	0.0	0.0	0.0		0.0	0.0	0.0	2.3
Volatile Organic Compounds (ng)								
trans-1,2-Dichloroethene	<25	<25	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethene	<25	<25	<25	<25	<25	<25	<25	<25
Trichloroethene	26	<25	<25	<25	<25	<25	<25	<25
Toluene	<25	<25	37	55	<25	<25	<25	50
Tetrachloroethene	<25	<25	<25 <25		<25	<25	<25	<25

Bold text indicates detection of an analyte

ng- nanogram

PID - photoionization detector with 10.6 eV

TABLE 13

CSIA Analytical Data

Site 78 Technical Memorandum

Well ID	³⁷ Cl CSIA (per mil)		¹³ C CSIA (per mil)			VOC (mg/L)			r Concentr (mM)	ation	Molar Fraction (%)		
	TCE	TCE	cis-DCE	VC	TCE	cis-DCE	VC	TCE	cis-DCE	VC	TCE	cis-DCE	VC
IR78-GW116MCH	4.3	-21.11	-22.46	-17.36	3,900	810	40	29.68	8.35	0.64	76.74	21.60	1.65
IR78-GW72	8.2	-6.77	-16.13	-18.65	4.4 J	150	160	0.03	1.55	2.56	0.81	37.37	61.82
IR78-GW114	1.4	-35.04	-	-	14	2.8 J	5 U	0.11	0.03	0.00	78.68	21.32	0.00
IR78-GW117UCH	4.3	-21.93	-24.37	-	50	13	5.1	0.38	0.13	0.08	63.83	22.49	13.68

mg/L - microgram per liter

mM- micromole

TABLE 16 Vapor Intrustion Screening Data - Site 78 North Site 78 Technical Memorandum

Station ID	NCCMOS	CMCI	IR78-GW22	IR78-0	GW22-1	IR78-GW23	IR78-GW24-1	IR78	-GW25	IR78-GW26	IR78-GW34
Sample ID	NCGWQS (Feb, 2012)	GWSL (Jan, 2014)	IR78-GW22-11C	IR78-GW22-1-11C	IR78-GW22-1D-11C	IR78-GW23-11C	IR78-GW24-1-11C	IR78-GW25-11C	IR78-GW25D-11C	IR78-GW26-11C	IR78-GW34-11C
Sample Date	(102) 2022)	(50) = 52	09/16/11	09/18/11	09/18/11	09/15/11	09/13/11	09/15/11	09/15/11	09/16/11	09/16/11
Chemical Name											
Volatile Organic Compounds (µg/l)											
1,1-Dichloroethane	6	334	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	164	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	97.8	1 U	81	76	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	N/A	2 U	2 U	2 U	20	110	2 U	2 U	2 U	2 U
Benzene	1	69.3	1 U	53	49	2.1	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	N/A	1 U	1 U	1 U	19	110	1 U	1 U	1 U	1 U
Ethylbenzene	600	152	1 U	1	1.2	1.1	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	N/A	1 U	1 U	1 U	0.81 J	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	298	2 U	9	9.6	2 U	2 U	2 U	2 U	2 U	2 U
Methylene Chloride	5	3,960	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	414	1 U	6.5	7.4	3.9	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	48.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	16,100	1 U	17	17	0.83 J	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	315	1 U	1 U	1 U	1.4	3.8	1 U	1 U	1 U	1 U
Trichloroethene	3	4.4	1 U	1 U	1 U	1 U	3.3	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	25	1 U	1 U	1 U	6	2.5	1 U	1 U	1 U	1 U
Xylene, total	500	414	3 U	16	17	4.4	3 U	3 U	3 U	3 U	3 U

Bold box indicates exceedance of NCGWQS or the more conservative MCL

Bold text indicates exceedance of GWSL

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

* - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

**Value reported is the NCAC 2L Interim Maximum Allowable Standard

J - Analyte present, value may or may not be accurate or precise U - Not detected

TABLE 16 Vapor Intrustion Screening Data - Site 78 North Site 78 Technical Memorandum

Station ID	Nechios	CMC	IR78-GW35	IR78-GW40	IR78-GW45R	IR78-GW46	IR78-GW48	IR78-GW85	IR78	-MWVI01
Sample ID	NCGWQS (Feb, 2012)	GWSL (Jan, 2014)	IR78-GW35-11C	IR78-GW40-11C	IR78-GW45R-11C	IR78-GW46-11C	IR78-GW48-11C	IR78-GW85-11C	IR78-MWVI01-11C	IR78-MWVI01-D-11C
Sample Date	(100) 2012)	(5011) 202-17	09/16/11	09/15/11	09/15/11	09/15/11	09/16/11	09/15/11	09/13/11	09/13/11
Chemical Name										
Volatile Organic Compounds (μg/l)										
1,1-Dichloroethane	6	334	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	164	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	97.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	N/A	2 U	2 U	2 U	1.5 J	2 U	2 U	84	89
Benzene	1	69.3	1 U	1 U	1 U	8	1 U	1 U	2.2	2.3
cis-1,2-Dichloroethene	70	N/A	1 U	1 U	1 U	1.5	1 U	1 U	82	87
Ethylbenzene	600	152	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	N/A	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	298	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene Chloride	5	3,960	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	414	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	48.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	16,100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	315	1 U	1 U	1 U	1 U	1 U	1 U	1.9	2.3
Trichloroethene	3	4.4	1 U	1 U	1 U	1 U	1 U	1 U	2.9	3
Vinyl chloride	0.03	25	1 U	1 U	1 U	1 U	1 U	1 U	25	25
Xylene, total	500	414	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Bold box indicates exceedance of NCGWQS or the more conservative MCL

Bold text indicates exceedance of GWSL

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

- * The MCL-Groundwater value is reported in place of the NCGWQS where the MCL val conservative.
- **Value reported is the NCAC 2L Interim Maximum Allowable Standard
- J Analyte present, value may or may not be accurate or precise U Not detected
- μg/I micrograms per liter

TABLE 16 Vapor Intrustion Screening Data - Site 78 North Site 78 Technical Memorandum

Station ID	NCCIMOS	GWSL	IR78-0	GW113	IR78-GW114	IR78-GW115	
Sample ID	NCGWQS (Feb, 2012)	(Jan, 2014)	IR78-GW113-12B	IR78-GW113D-12B	IR78-GW114-12B	IR78-GW115-12B	
Sample Date	(100) 2022)	(*****) = 0 = 1)	05/22/12	05/22/12	05/23/12	05/24/12	
Chemical Name							
Volatile Organic Compounds (μg/l)							
1,1-Dichloroethane	6	334	1 U	1 U	1 U	1 U	
1,1-Dichloroethene*	7	164	1 U	1 U	1 U	1 U	
1,2-Dichloroethane	0.4	97.8	1 U	1 U	1 U	1 U	
1,2-Dichloroethene (total)**	60	N/A	20	19	5	1 U	
Benzene	1	69.3	1 U	1 U	1 U	1 U	
cis-1,2-Dichloroethene	70	N/A	20	19	2.2	1 U	
Ethylbenzene	600	152	1 U	1 U	1 U	1 U	
Isopropylbenzene	70	N/A	1 U	1 U	1 U	1 U	
m- and p-Xylene	500	298	2 U	2 U	2 U	2 U	
Methylene Chloride	5	3,960	5 U	5 U	5 U	5 U	
o-Xylene	500	414	1 U	1 U	1 U	1 U	
Tetrachloroethene	0.7	48.4	1 U	1 U	14	1 U	
Toluene	600	16,100	1 U	1 U	1 U	1 U	
trans-1,2-Dichloroethene	100	315	1 U	1 U	2.8	1 U	
Trichloroethene	3	4.4	1.7 J	1.5 J	9.5	1 U	
Vinyl chloride	0.03	25	1 U	1 U	1 U	1 U	
Xylene, total	500	414	3 U	3 U	3 U	3 U	

Bold box indicates exceedance of NCGWQS or the more conservative MCL

Bold text indicates exceedance of GWSL

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

- * The MCL-Groundwater value is reported in place of the NCGWQS where the MCL val conservative.
- **Value reported is the NCAC 2L Interim Maximum Allowable Standard
- J Analyte present, value may or may not be accurate or precise U Not detected
- μg/I micrograms per liter

TABLE 17 Vapor Intrusion Screening Data - Site 78 South
Site 78 Technical Memorandum

Station ID	Necimos	C) M C)	IR78-GW01	IR78-GW02	IR78-GW03	IR78-GW04-1	IR78-GW05	IR78-GW08	IR78-GW09-1	IR78-GW10	IR78-GW11	IR78-GW12	IR78-GW13	IR78-GW14
	NCGWQS	GWSL												
Sample ID	(Feb, 2012)	(Jan, 2014)	IR78-GW01-11C	IR78-GW02-11C	IR78-GW03-11C	IR78-GW04-1-11C	IR78-GW05-11C	IR78-GW08-11C	IR78-GW09-1-11C	IR78-GW10-11C	IR78-GW11-11C	IR78-GW12-11C	IR78-GW13-11C	IR78-GW14-11C
Sample Date	<u> </u>		09/15/11	09/15/11	09/14/11	09/14/11	09/15/11	09/16/11	09/12/11	09/15/11	09/15/11	09/14/11	09/17/11	09/16/11
Chemical Name														
Volatile Organic Compounds (μg/l)														
1,1-Dichloroethane	6	334	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	164	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	97.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	N/A	5.6	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Benzene	1	69.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	N/A	5.1	1 U	1 U	1 U	1 U	1 U	0.75 J	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	600	152	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	N/A	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	298	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	5	3,960	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	414	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	48.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	16,100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	315	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	3	4.4	9	1 U	1 U	1 U	1 U	1 U	40	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	25	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	500	414	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

 $\ensuremath{^*}$ - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL value is more conservative.

**Value reported is the NCAC 2L Interim Maximum Allowable Standard

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituents

J - Analyte present, value may or may not be accurate or

U - Not detected

TABLE 17 Vapor Intrusion Screening Data - Site 78 South Site 78 Technical Memorandum

Station ID	NCGWQS	GWSL	IR78-GW16	IR78-GW17-1	IR78-GW17-4	IR78-	GW20	IR78-GW21	IR78	-GW29
Sample ID	(Feb, 2012)	(Jan, 2014)	IR78-GW16-11C	IR78-GW17-1-11C	IR78-GW17-4-11C	IR78-GW20-11C	IR78-GW20D-11C	IR78-GW21-11C	IR78-GW29-11C	IR78-GW29D-11C
Sample Date			09/16/11	09/16/11	09/17/11	09/16/11	09/16/11	09/17/11	09/14/11	09/14/11
Chemical Name										
Volatile Organic Compounds (µg/l)										
1.1-Dichloroethane	6	334	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene*	7	164	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	0.4	97.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	N/A	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Benzene	1	69.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	70	N/A	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	600	152	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	70	N/A	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	500	298	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	5	3,960	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	414	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	0.7	48.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	600	16,100	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	100	315	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	3	4.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	0.03	25	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	500	414	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

 $\ensuremath{^*}$ - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL va more conservative.

**Value reported is the NCAC 2L Interim Maximum Allowable Standard

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituent

J - Analyte present, value may or may not be accurate or

U - Not detected

TABLE 17 Vapor Intrusion Screening Data - Site 78 South Site 78 Technical Memorandum

Station ID	NCGWQS	GWSL	IR78-	GW36	IR78-GW37	IR78-GW39	IR78-GW42	IR78-GW50	IR78-GW51R	IR78-GW53R	IR78-GW54R	IR78-GW56
Sample ID	(Feb, 2012)	(Jan, 2014)	IR78-GW36-11C	IR78-GW36D-11C	IR78-GW37-11C	IR78-GW39-11C	IR78-GW42-11C	IR78-GW50-11C	IR78-GW51R-11C	IR78-GW53R-11C	IR78-GW54R-11C	IR78-GW56-11C
Sample Date			09/14/11	09/14/11	09/14/11	09/17/11	09/15/11	09/15/11	09/15/11	09/15/11	09/14/11	09/14/11
Chemical Name												
Volatile Organic Compounds (μg/l)												
1,1-Dichloroethane	6	334	1 U	1 U	1 U	1 U	120	1 U	1 U	2 U	1 U	1 U
1,1-Dichloroethene*	7	164	1 U	1 U	1 U	1 U	14	1 U	1 U	2 U	1 U	1 U
1,2-Dichloroethane	0.4	97.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
1,2-Dichloroethene (total)**	60	N/A	2 U	2 U	2 U	2 U	500	2 U	2 U	4 U	2.4	2 U
Benzene	1	69.3	1 U	1 U	1 U	1 U	2.6	1 U	1 U	220	1 U	1 U
cis-1,2-Dichloroethene	70	N/A	1 U	1 U	1 U	1 U	500	1 U	1 U	2 U	2.4	0.77 J
Ethylbenzene	600	152	1 U	1 U	1 U	1 U	1 U	1 U	1 U	52	1 U	1 U
Isopropylbenzene	70	N/A	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
m- and p-Xylene	500	298	2 U	2 U	2 U	2 U	2 U	2 U	2 U	37	2 U	2 U
Methylene chloride	5	3,960	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	414	1 U	1 U	1 U	1 U	0.95 J	1 U	1 U	17	1 U	1 U
Tetrachloroethene	0.7	48.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U	1 U
Toluene	600	16,100	1 U	1 U	1 U	1 U	2.5	1 U	1 U	110	1 U	1 U
trans-1,2-Dichloroethene	100	315	1 U	1 U	1 U	1 U	2.1	1 U	1 U	2 U	1 U	1 U
Trichloroethene	3	4.4	1 U	1 U	1 U	1 U	8.1	1 U	1 U	2 U	1 U	1.2
Vinyl chloride	0.03	25	1 U	1 U	1 U	1 U	140	1 U	1 U	2 U	1.2	1 U
Xylene, total	500	414	3 U	3 U	3 U	3 U	3 U	3 U	3 U	54	3 U	3 U

 $\ensuremath{^*}$ - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL va more conservative.

**Value reported is the NCAC 2L Interim Maximum Allowable Standard

RSLs were adjusted for noncarcinogens to account for exposure to multiple constituent

J - Analyte present, value may or may not be accurate or

U - Not detected

TABLE 17 Vapor Intrusion Screening Data - Site 78 South
Site 78 Technical Memorandum

Station ID	NCGWQS	GWSL	IR78-GW57	IR78-GW59	IR78-GW60	IR78-GW63	IR78-GW64	IR78-GW66	IR78-GW68	IR78-GW73	IR78-GW76	IR78-GW107	IR78-RW09R
Sample ID	(Feb, 2012)	(Jan, 2014)	IR78-GW57-11C	IR78-GW59-11C	IR78-GW60-11C	IR78-GW63-11C	IR78-GW64-11C	IR78-GW66-11C	IR78-GW68-11C	IR78-GW73-11C	IR78-GW76-11C	IR78-GW107-11C	IR78-RW09R-11C
Sample Date			09/15/11	09/14/11	09/15/11	09/14/11	09/14/11	09/14/11	09/14/11	09/12/11	09/12/11	09/15/11	09/14/11
Chemical Name													
Valuit Constitution													
Volatile Organic Compounds (μg/l)	_												
1,1-Dichloroethane	6	334	1 U	1 U	1 U	1 U	1 U	3.2	1 U	1 U	1 U	2.3	1 U
1,1-Dichloroethene*	7	164	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	7	1 U
1,2-Dichloroethane	0.4	97.8	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)**	60	N/A	2 U	3.1	1.8 J	17	9.6	1.6 J	2 U	2 U	350	68	2 U
Benzene	1	69.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.59 J	1 U
cis-1,2-Dichloroethene	70	N/A	0.57 J	3.1	1.8 J	16	9.6	1.6	1.1	1 U	400	67	1 U
Ethylbenzene	600	152	1 U	1 U	1,900	1 U	1 U	1 U	1 U	1 U	200	1 U	1 U
Isopropylbenzene	70	N/A	1 U	1 U	160 J	1 U	1 U	1 U	1 U	3.9	76	1 U	1 U
m- and p-Xylene	500	298	2 U	2 U	6,000	2 U	2 U	2 U	2 U	2 U	1,600	2 U	2 U
Methylene chloride	5	3,960	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	500	414	1 U	1 U	2,100	1 U	1 U	1 U	1 U	1 U	480	1 U	1 U
Tetrachloroethene	0.7	48.4	1 U	1 U	1 U	1 U	1 U	1 U	1 U	10	1.1	1 U	1 U
Toluene	600	16,100	1 U	1 U	210	1 U	1 U	1 U	1 U	1 U	11	1 U	1 U
trans-1,2-Dichloroethene	100	315	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3	1 U	1 U
Trichloroethene	3	4.4	1 U	1 U	420	2	1.4	1 U	1 U	1 U	420	26	1 U
Vinyl chloride	0.03	25	0.78 J	1.4	1 U	1 U	1 U	41	1 U	1 U	0.93 J	3.4	1 U
Xylene, total	500	414	3 U	3 U	8,200	3 U	3 U	3 U	3 U	3 U	2,100	3 U	3 U

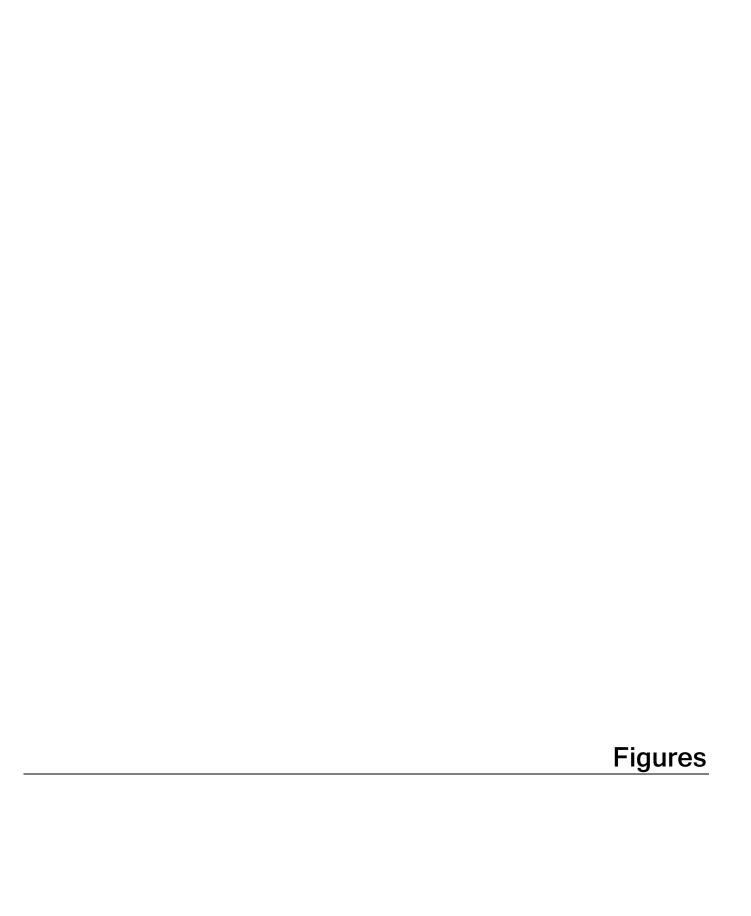
 $\ensuremath{^*}$ - The MCL-Groundwater value is reported in place of the NCGWQS where the MCL va more conservative.

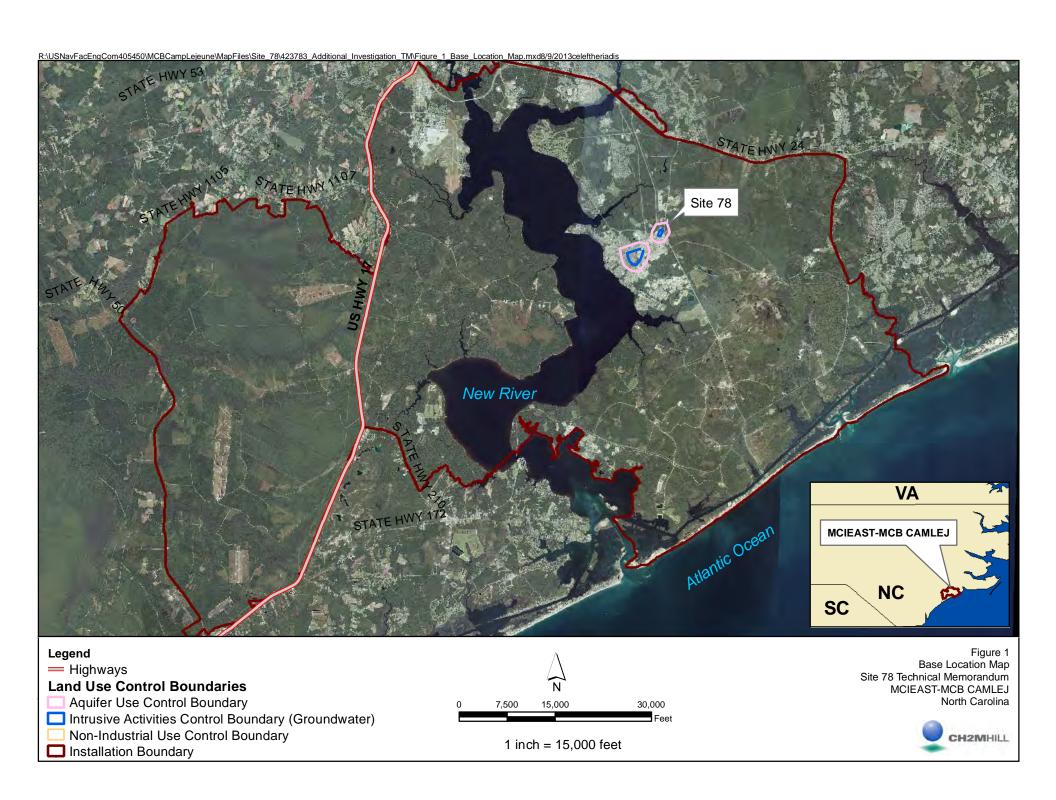
**Value reported is the NCAC 2L Interim Maximum Allowable Standard

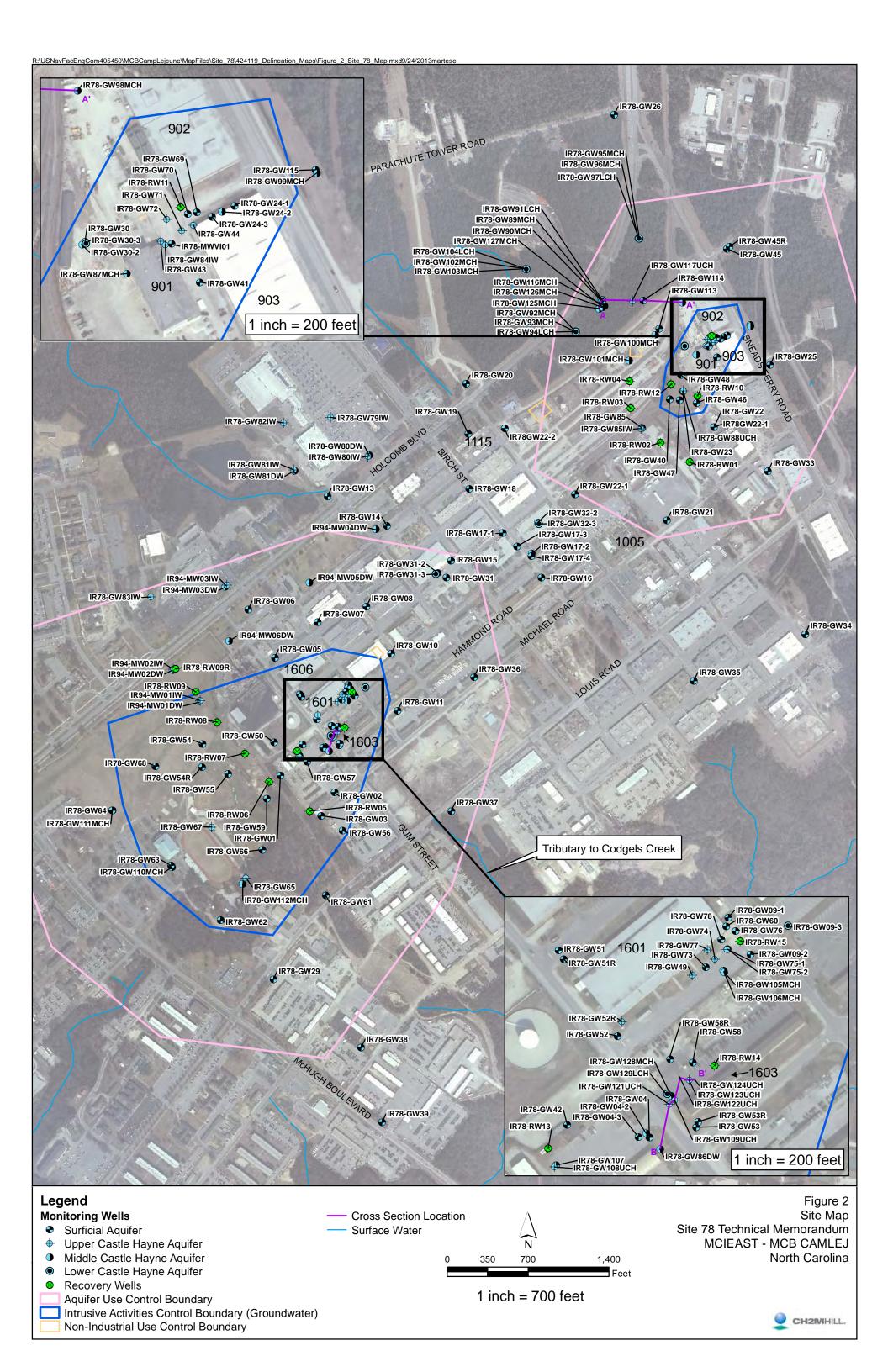
RSLs were adjusted for noncarcinogens to account for exposure to multiple constituent

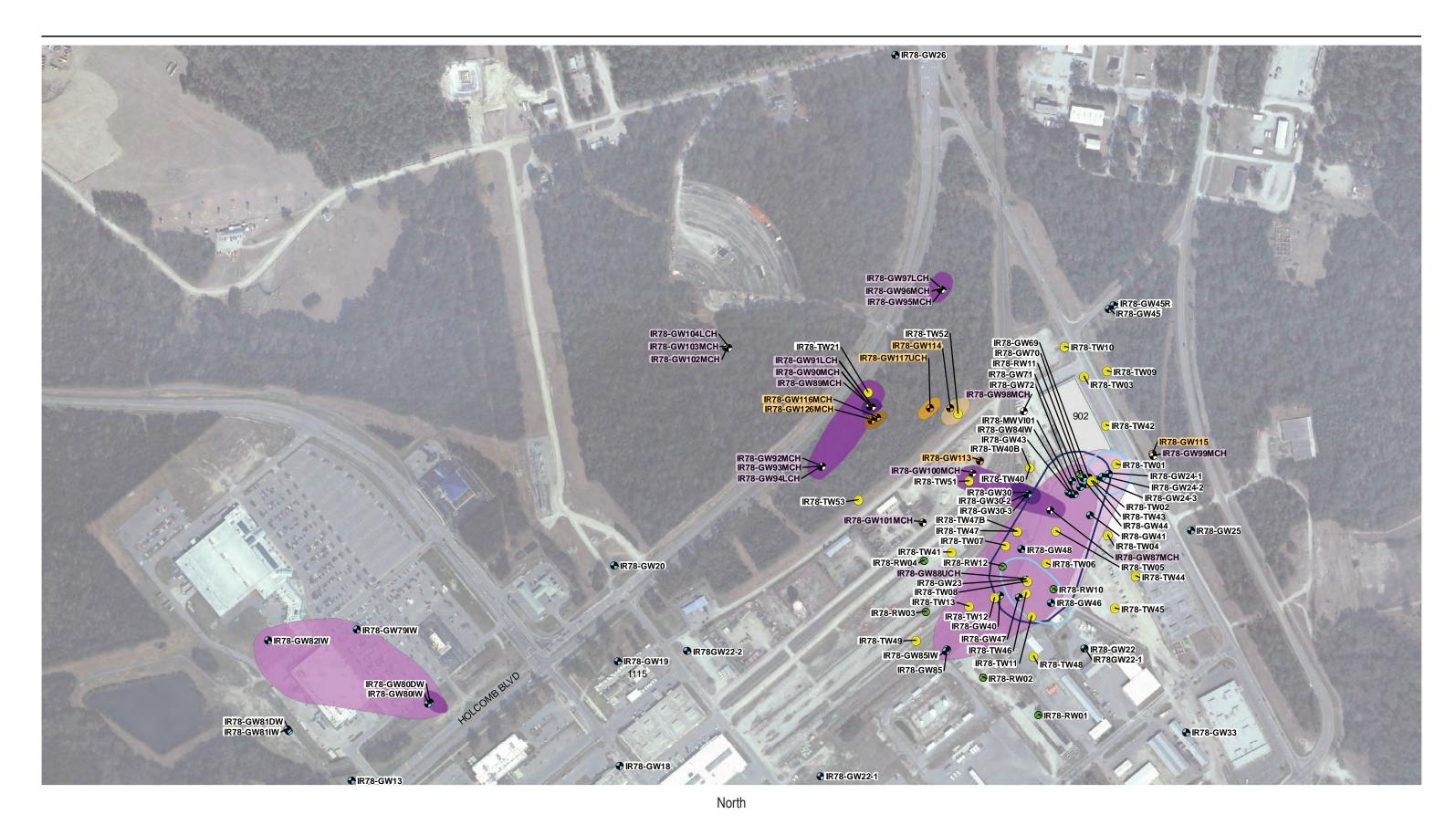
J - Analyte present, value may or may not be accurate or

U - Not detected

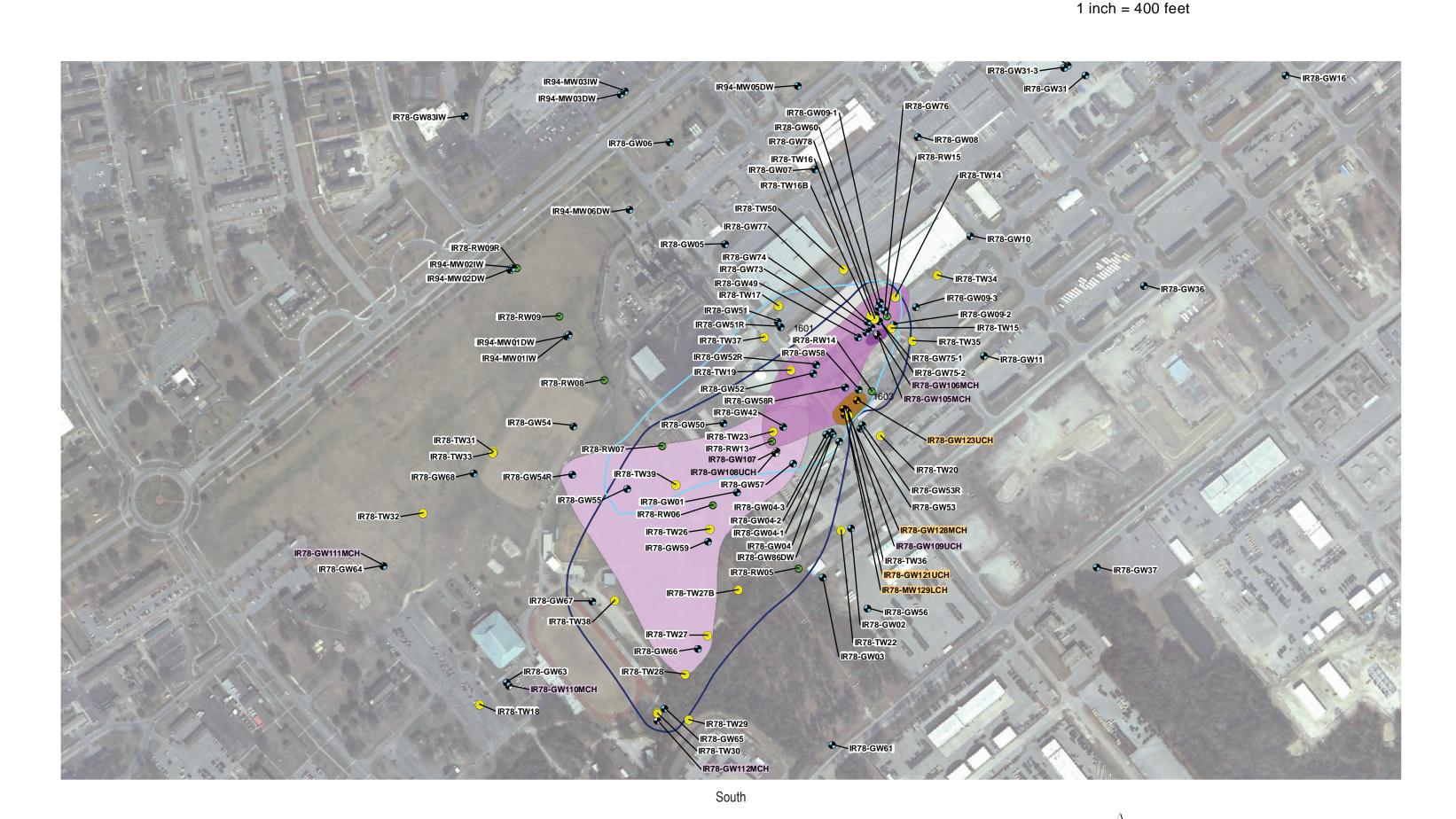








N 0 200 400 800 Feet



Confirmatory Groundwater Investigation* (September 2011)

Surficial Aquifer
Upper Castle Hayne Aquifer
Middle Castle Hayne Aquifer
Upper Castle Hayne Aquifer
Middle Castle Hayne Aquifer
Middle Castle Hayne Aquifer
*Plumes interpolated based on exceedance of NCGWQS/MCL.

Summary of Investigations

MCIEAST-MCB CAMLEJ

Site 78 Technical Memorandum

FIGURE 3

Recovery Well

OPT Sample Location (Rhea, 2011)

Groundwater VOC Plume Area (2010)

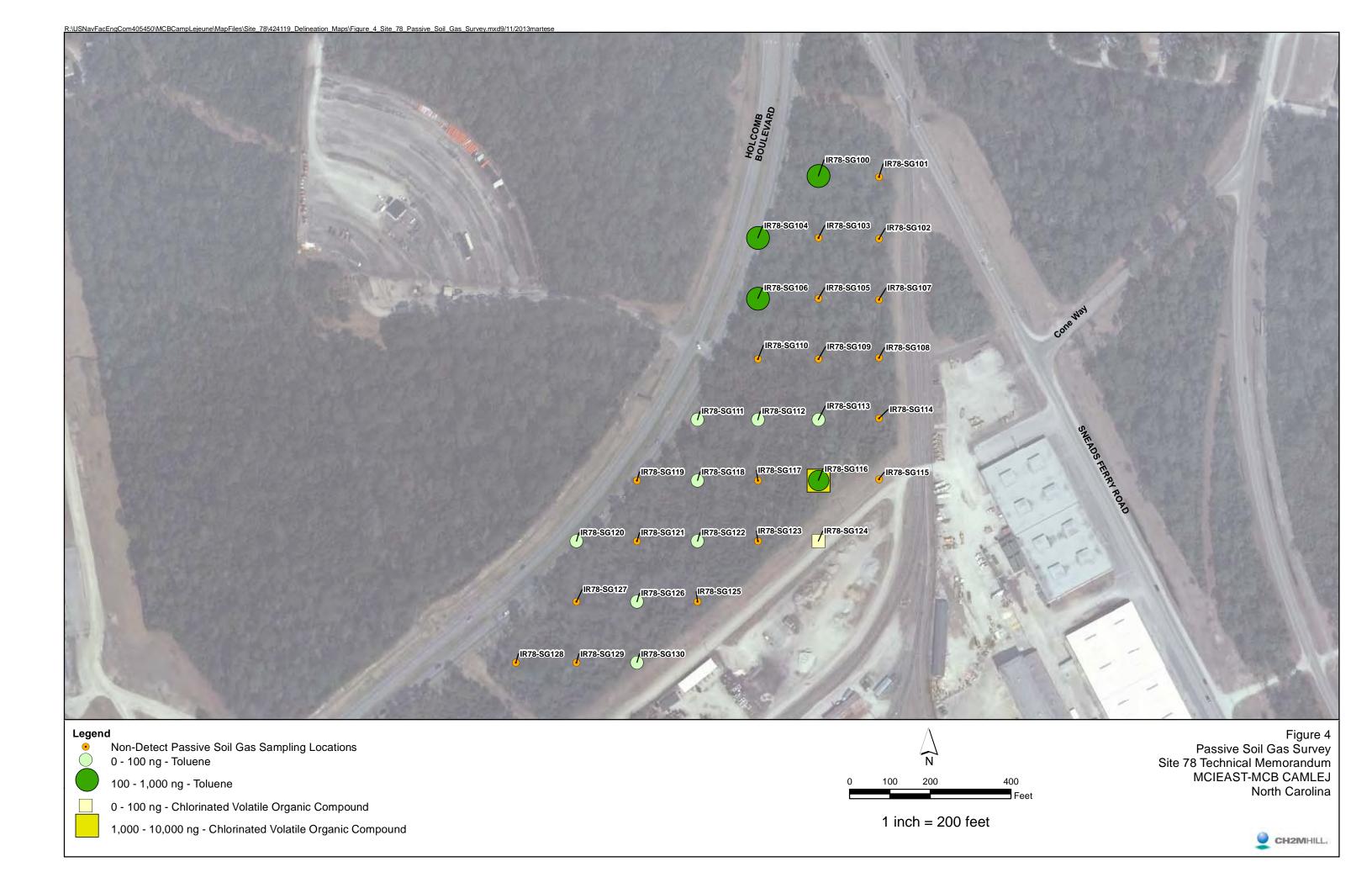
Monitoring Well - Confirmatory Groundwater Investigation

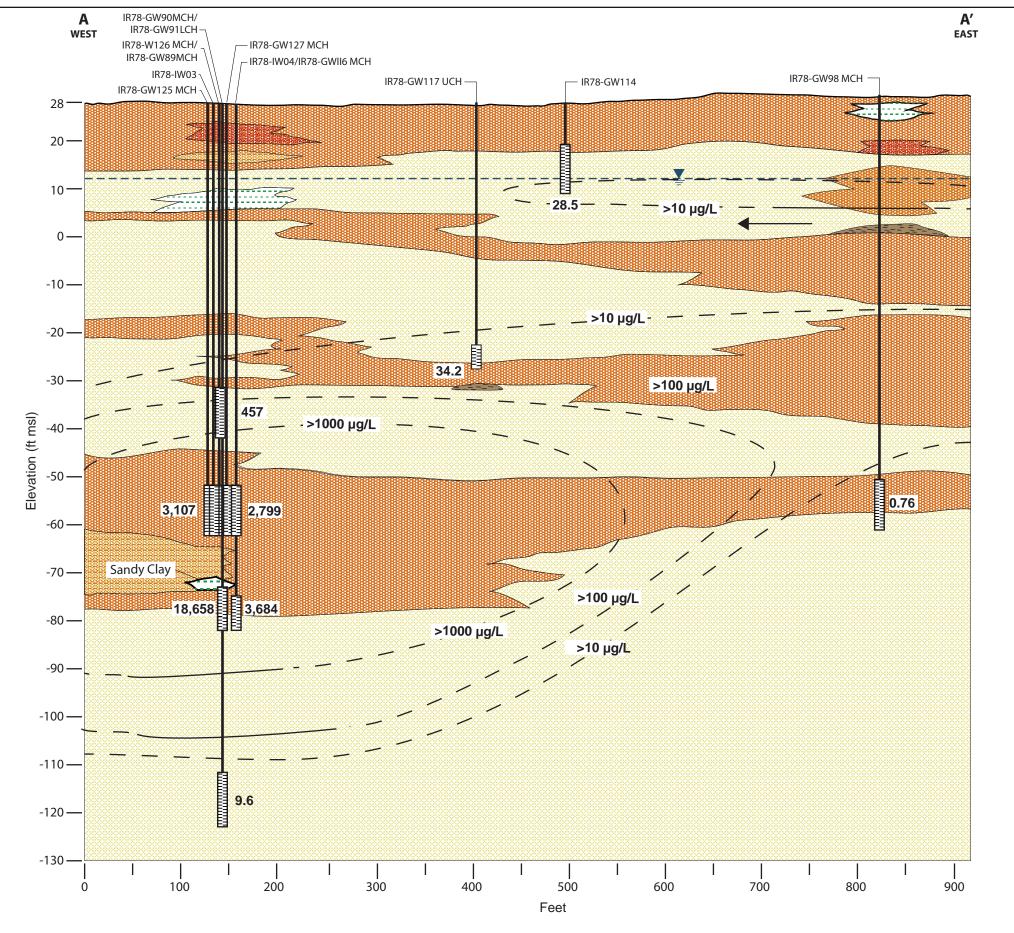
Monitoring Well - Additional GW Investigation

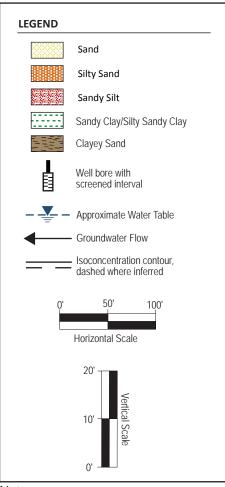
Monitoring Well - Existing

Shallow VOC Plume - LTM

Legend







- 1. The depth and thickness of the subsurface strata indicated on this section (profile) were generalized from and interpolated between test locations. Information on actual subsurface conditions applies only to the specific locations and dates indicated. Subsurface conditions at other locations may differ from conditions occurring at the indicated location.
- 2. Total volatile organic compound (VOC) data from 9/2011, 4/2012, and 5/2012.
- 3. µg/L micrograms per liter
- 4. NS Not sampled
- 5. ft msl feet above mean sea level

Figure 5 Site 78 N Cross-Section A-A' Site 78 North MCIEAST-MCB CAMLEJ North Carolina

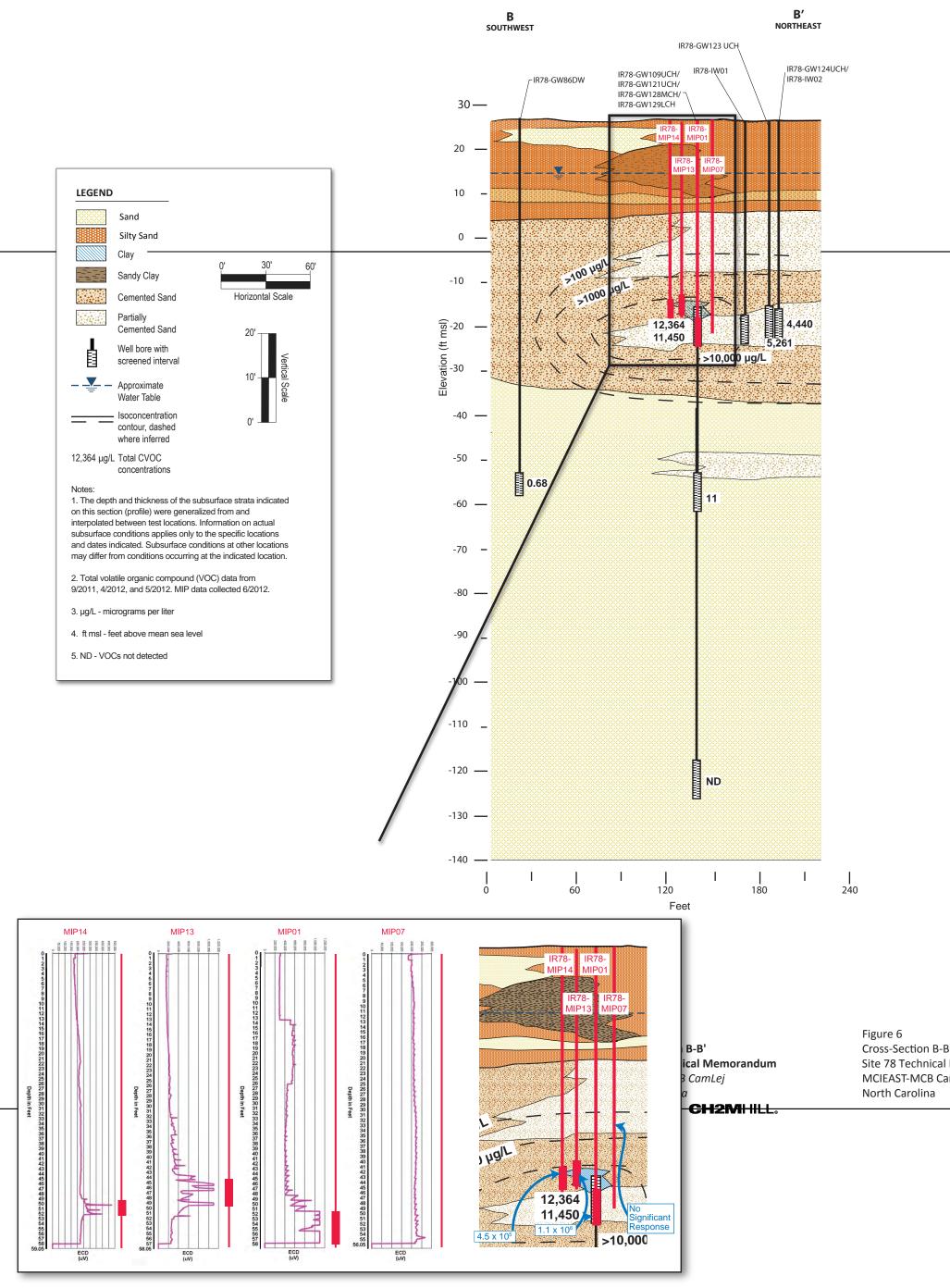
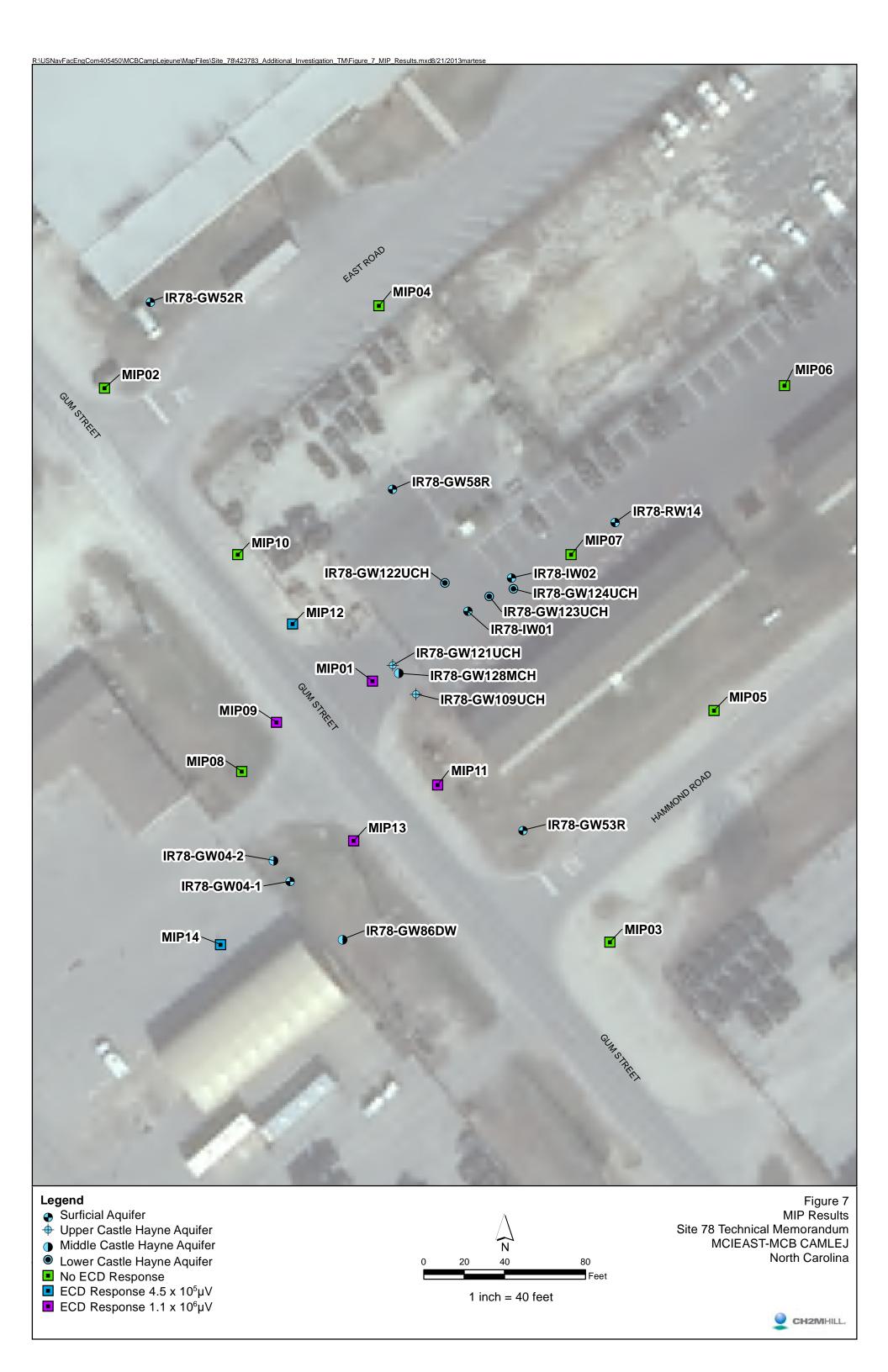
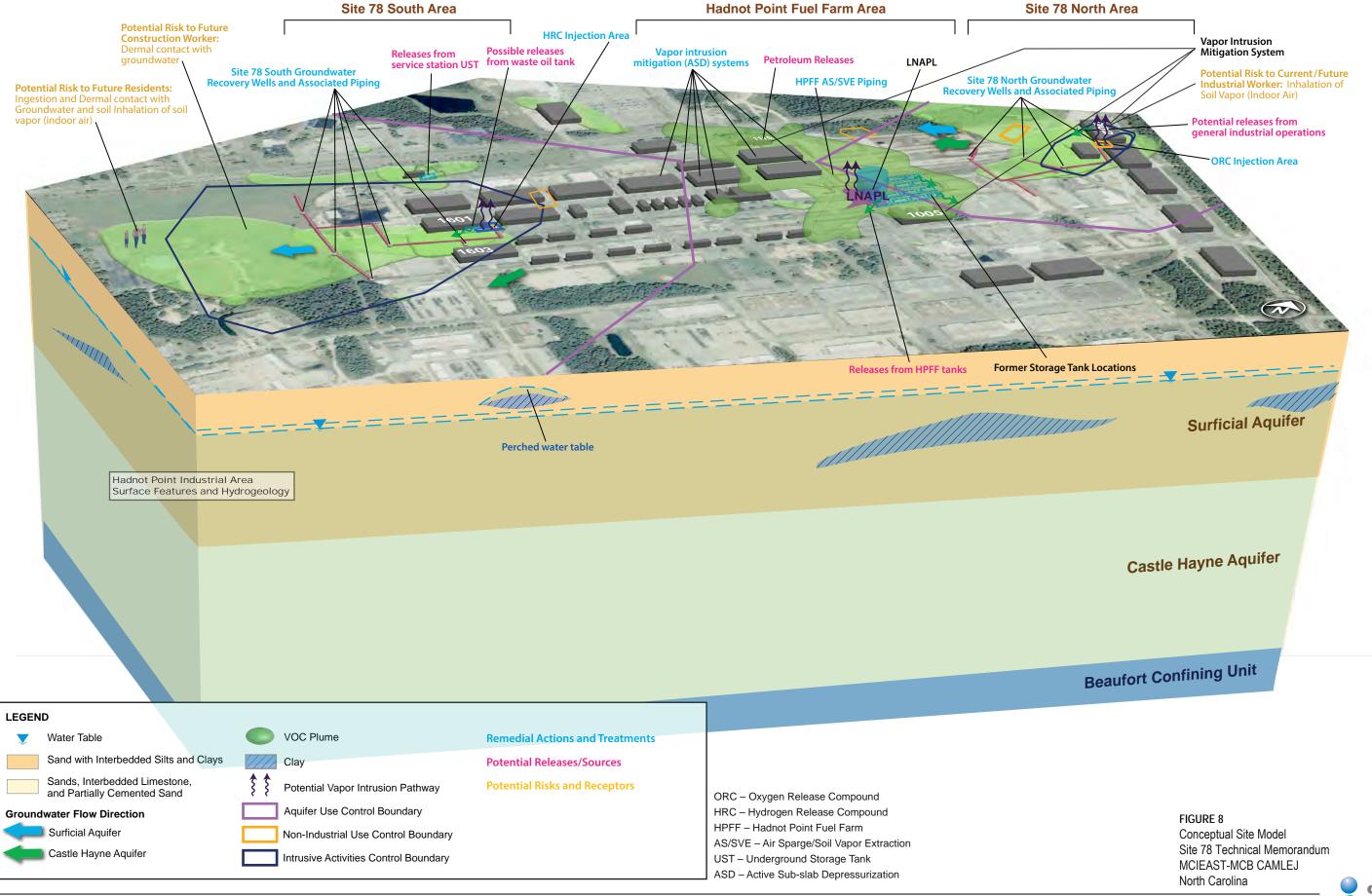
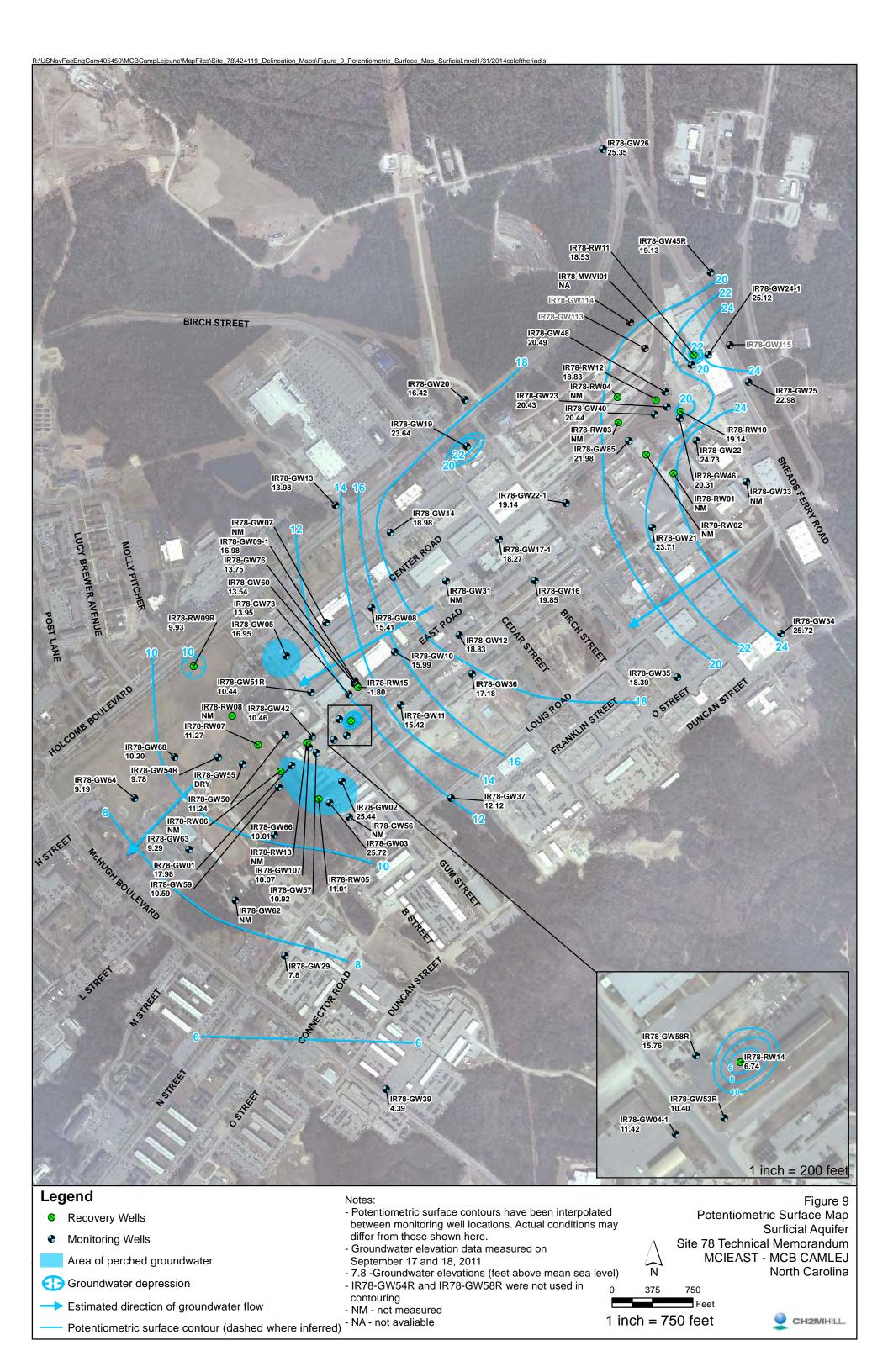


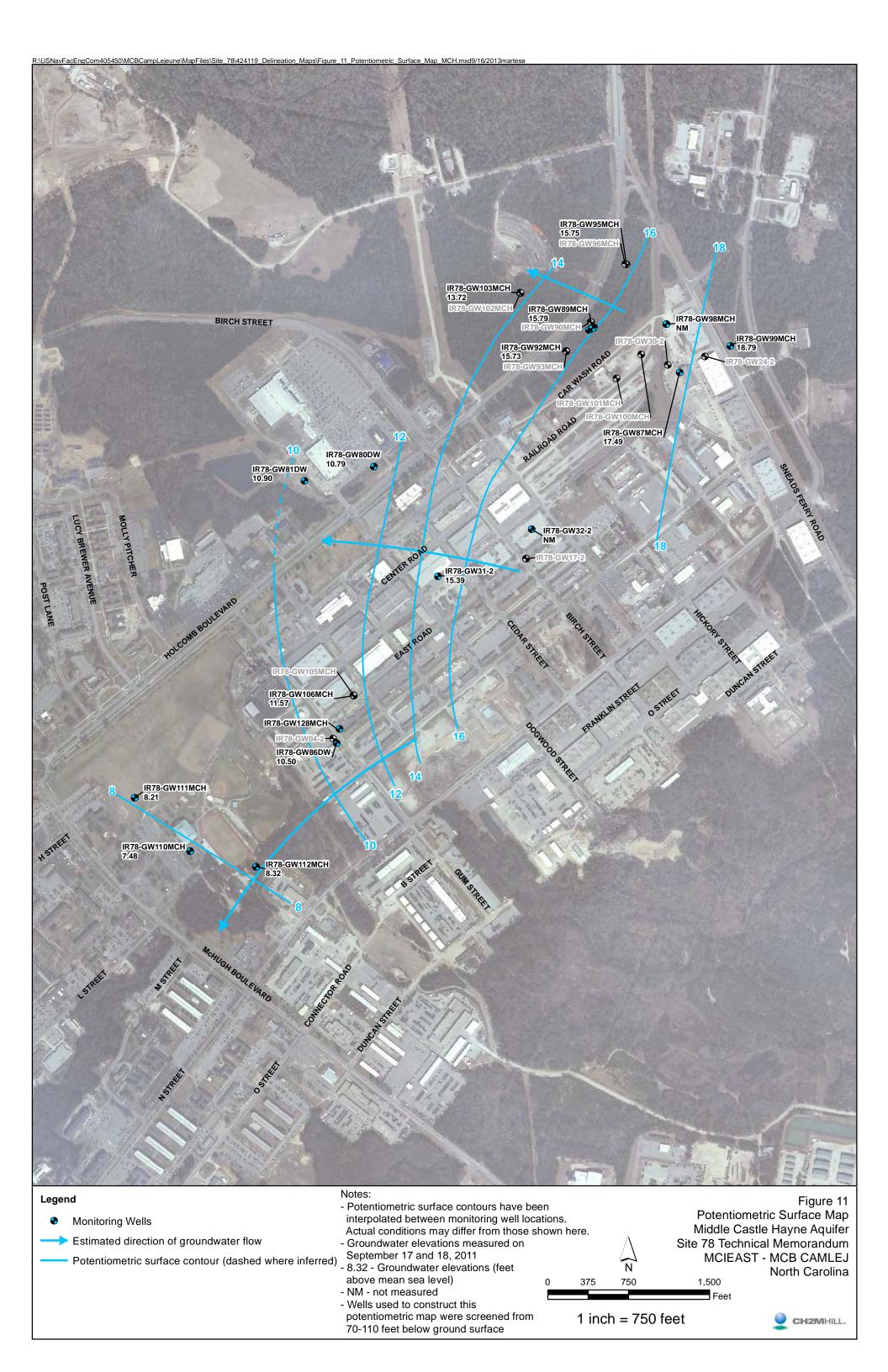
Figure 6 Cross-Section B-B' Site 78 Technical Memorandum MCIEAST-MCB CAMLEJ North Carolina







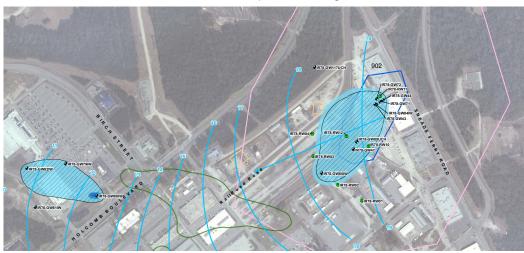




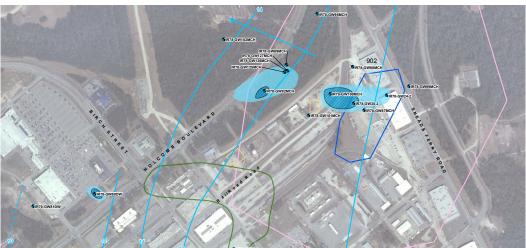




Surficial Aquifer 0'-30' bgs



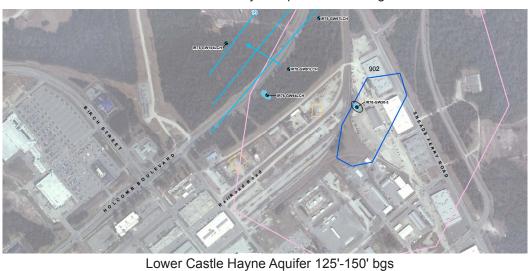
Upper Castle Hayne Aquifer 30'-60' bgs



Middle Castle Hayne Aquifer 70'-90' bgs



Middle Castle Hayne Aquifer 90'-125' bgs



- Monitoring Well
- Monitoring Well not in LTM
- Recovery Well
- Estimated direction of groundwater flow
 Potentiometric surface contour

Land Use Control Boundaries

- Aquifer Use Control Boundary
- Intrusive Activities Control Boundary (Groundwater)
 Non-Industrial Use Control Boundary
- Note: Detections of BTEX below NCGWQS are shown to

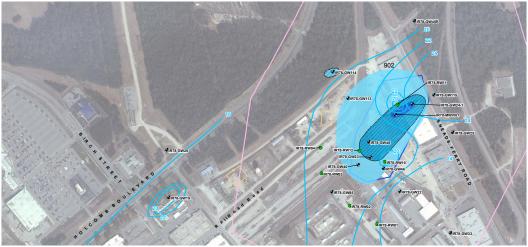
further refine the conceptual site model

0 200 400 **BTEX Plume Concentrations**

- - **1**0-100 μg/L
- 100-1,000 μg/L
- Exceeds NCGWQS
- HPFF BTEX Plume (Shaw, 2009)

FIGURE 13 BTEX Plume Maps - North Site 78 Technical Memorandum MCIEAST-MCB CAMLEJ North Carolina

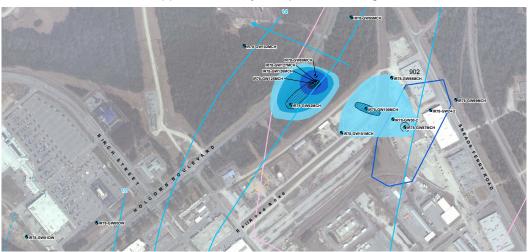




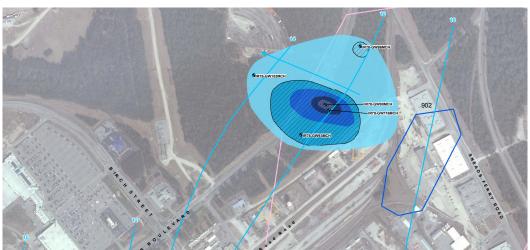
Surficial Aquifer 0'-30' bgs



Upper Castle Hayne Aquifer 30'-60' bgs



Middle Castle Hayne Aquifer 70'-90' bgs



Middle Castle Hayne Aquifer 90'-125' bgs



- Monitoring Well
- Monitoring Well not in LTM
- Recovery Well
- → Estimated direction of groundwater flow Potentiometric surface contour

Land Use Control Boundaries

- Aquifer Use Control Boundary
- Intrusive Activities Control Boundary (Groundwater)

 Non-Industrial Use Control Boundary

Note: Detections of CVOCs below NCGWQS are shown to further refine the conceptual site model

CVOC Plume Concentrations

0-10 μg/L 10-100 μg/L

100-1,000 μg/L 1,000-10,000 μg/L >10,000 μg/L

Exceeds NCGWQS

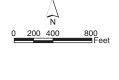
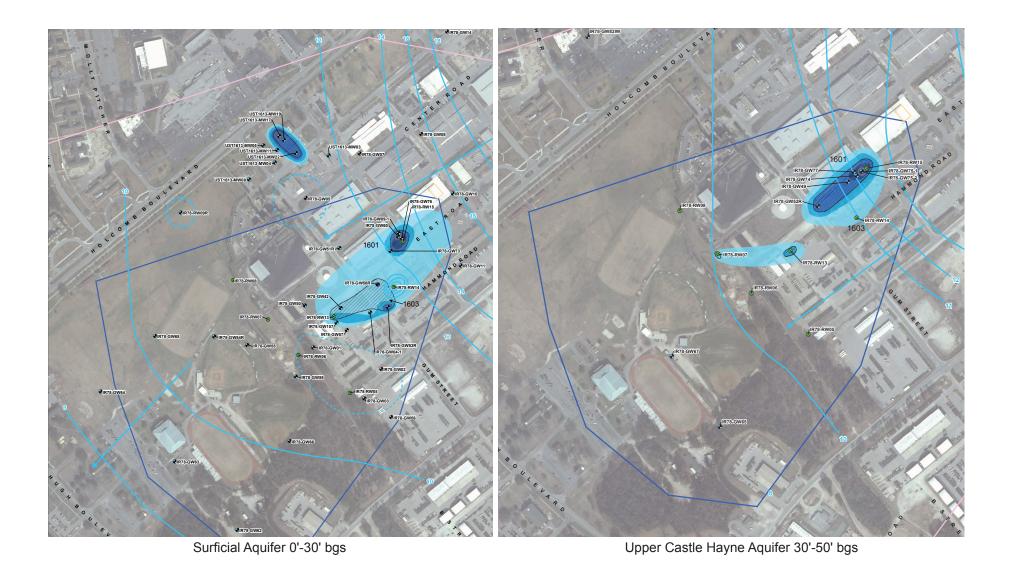


FIGURE 14 CVOC Plume Maps - North Site 78 Technical Memorandum MCIEAST-MCB CAMLEJ North Carolina





1621

Property of the second o

Upper Castle Hayne Aquifer 50'-60' bgs

Middle Castle Hayne Aquifer 60'-125' bgs

- Monitoring Well
- Monitoring Well Not in LTM
- Monitoring Well Measured LNAPL
- Recovery Wells
- Estimated direction of groundwater flow
- Potentiometric surface contour

 Area of perched groundwater
- Groundwater depression

Land Use Control Boundaries

- Aquifer Use Control Boundary
- Non-Industrial Use Control Boundary
- Intrusive Activities Control Boundary (Groundwater)

Note: Detections of BTEX below NCGWQS are shown to further refine the conceptual site model

BTEX Concentration Plumes

150 300

0-10 μg/L

10-100 μg/L

100-1,000 μg/L

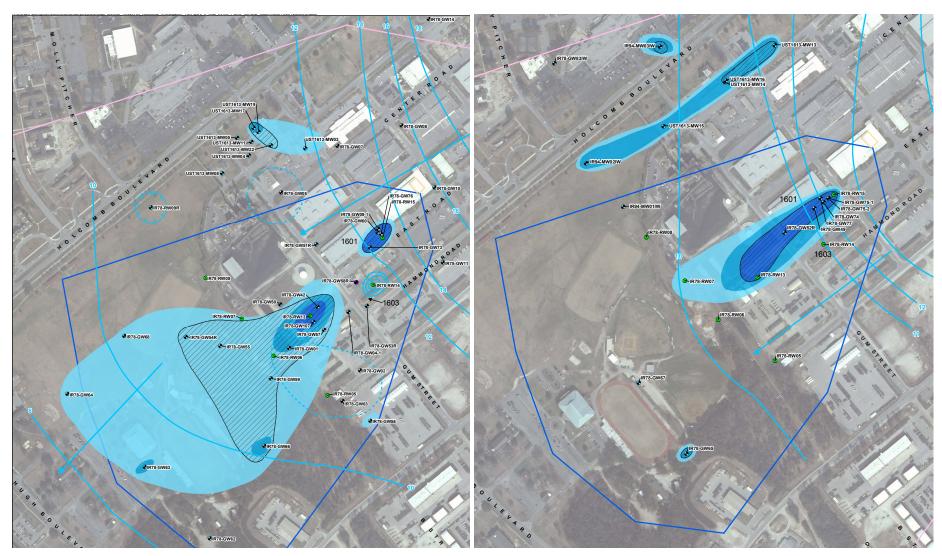
1,000-10,000 μg/L

>10,000 µg/L

Exceeds NCGWQS

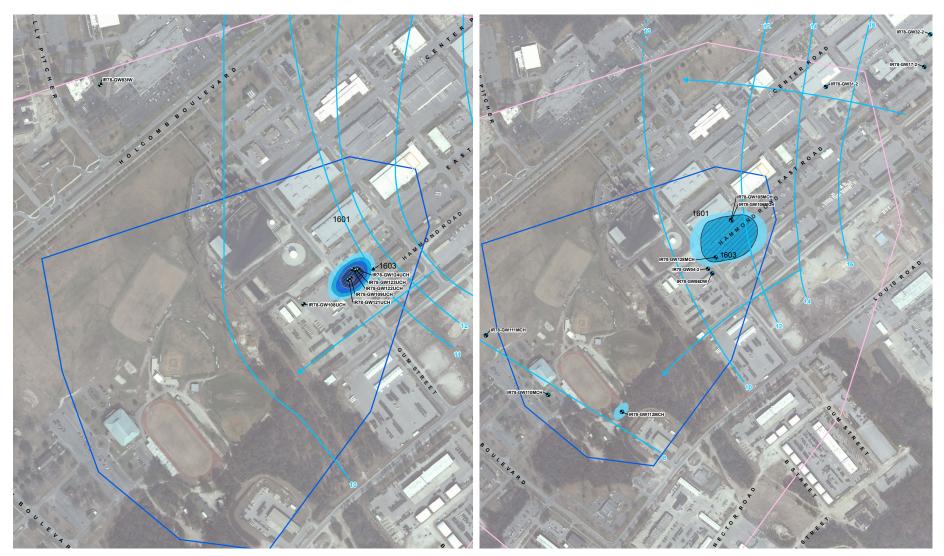
FIGURE 15
BTEX Plume Maps – South
Site 78 Technical Memorandum
MCIEAST-MCB CAMLEJ
North Carolina





Surficial Aquifer 0'-30' bgs

Upper Castle Hayne Aquifer 30'-50' bgs



Upper Castle Hayne Aquifer 50'-60' bgs

Middle Castle Hayne Aquifer 60'-125' bgs

- Monitoring Well
- Monitoring Well Not in LTM
- Monitoring Well Measured LNAPL
- Recovery Wells
- Estimated direction of groundwater flow
- Potentiometric surface contour
- Area of perched groundwater

Groundwater depression

- Land Use Control Boundaries

 Aquifer Use Control Boundary
- Non-Industrial Use Control Boundary
- Intrusive Activities Control Boundary (Groundwater)

Note: Detections of CVOCs below NCGWQS are shown to further refine the conceptual site model

0 150 300 600 Epot

Total CVOC Concentration Plumes

0-10 μg/L

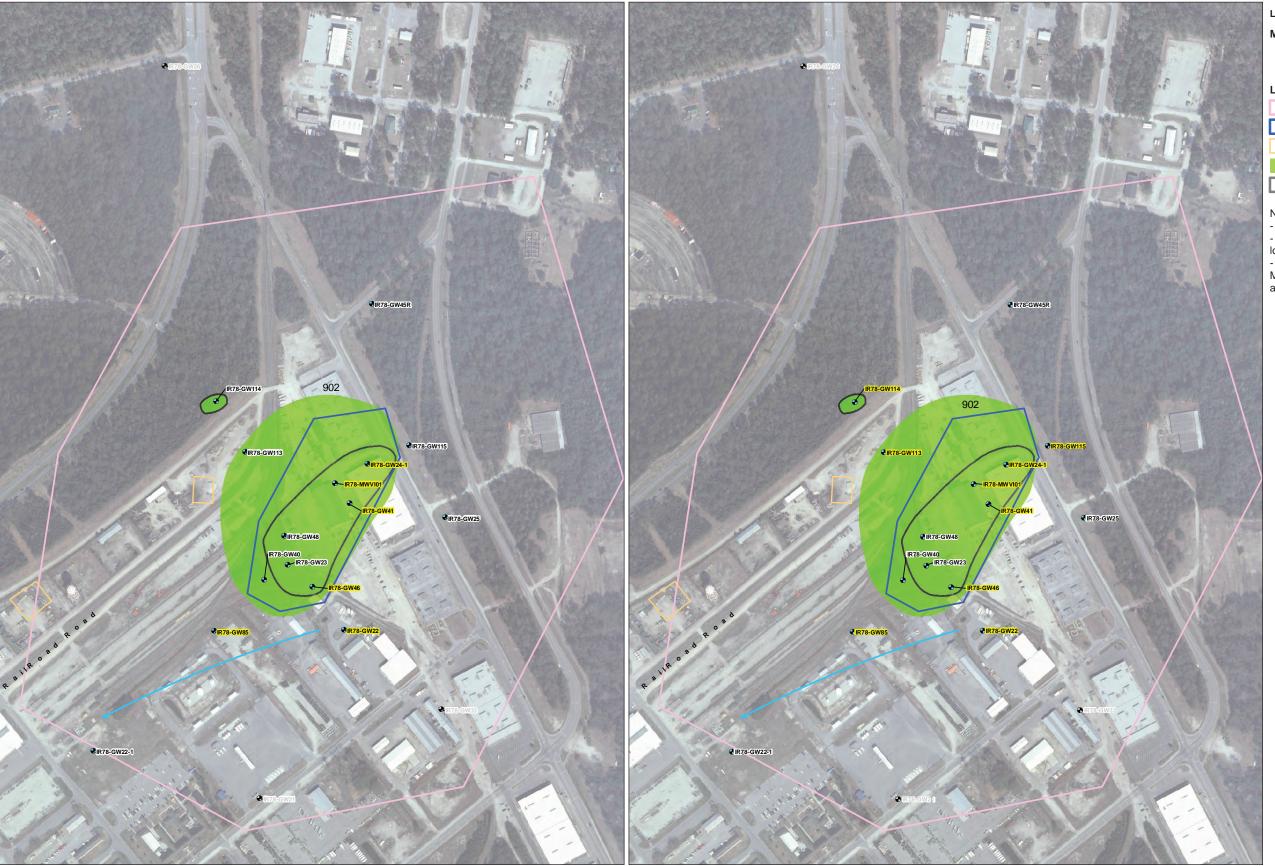
10-100 μg/L

100-1,000 μg/L

1,000-10,000 µg/L

>10,000 µg/L Exceeds NCGWQS FIGURE 16 CVOC Plume Maps – South Site 78 Technical Memorandum MCIEAST-MCB CAMLEJ North Carolina





Current LTM Network (2013)

Proposed LTM Network (2014)

Legend

Monitoring Wells

Surficial

Surficial - not sampled

Land Use Control Boundaries

Aquifer Use Control Boundary

Intrusive Activities Control Boundary (Groundwater) Non-Industrial Use Control Boundary

Extent of VOC Detection

Extent of VOC Exceedance of NCGWQS

Note:

- Data collected from September 2011 to May 2012
 Wells highlighted in yellow are included in long-term monitoring program
 The LTM network will be re-evaluated pending MILCON completion to determine if additional wells are needed to monitor VOCs

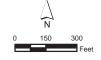


FIGURE 17 Site 78 North - Current and Proposed LTM Wells - Surficial Aquifer Site 78 Technical Memorandum MCIEAST-MCB CAMLEJ

> North Carolina CH2MHILL.



Current LTM Network (2013)



Proposed LTM Network (2014)

- Upper Castle HayneRecovery Well
- ⊗ Recovery Well not sampled

Land Use Control Boundaries

- Aquifer Use Control Boundary
- Non-Industrial Use Control Boundary
- ☐ Intrusive Activities Control Boundary (Groundwater)
- Extent of VOC Detection
- Extent of VOC Exceedance of NCGWQS

- Data collected from September 2011 to May 2012 Wells highlighted in yellow are included in
- long-term monitoring program
- The LTM network will be re-evaluated pending MILCON completion to determine if additional wells are needed to monitor VOCs

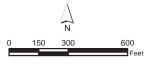
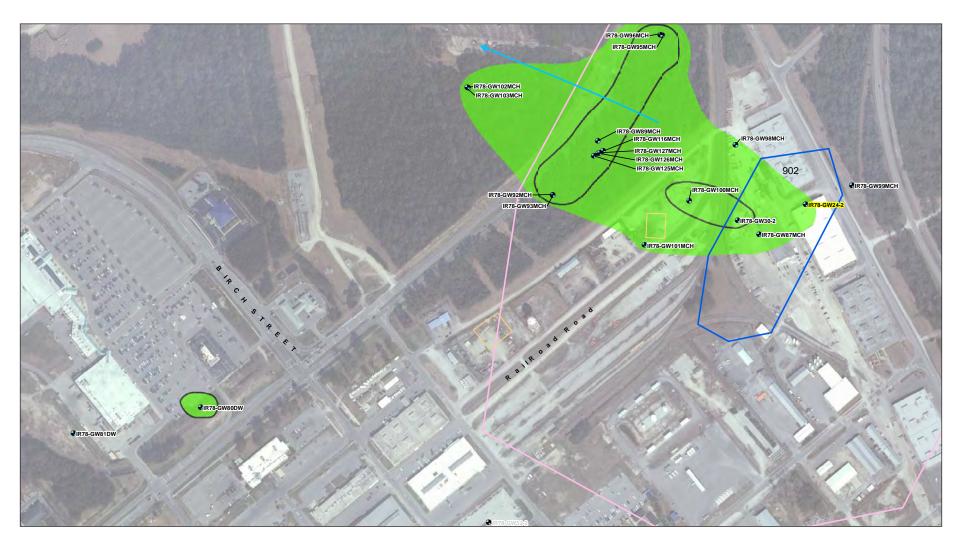


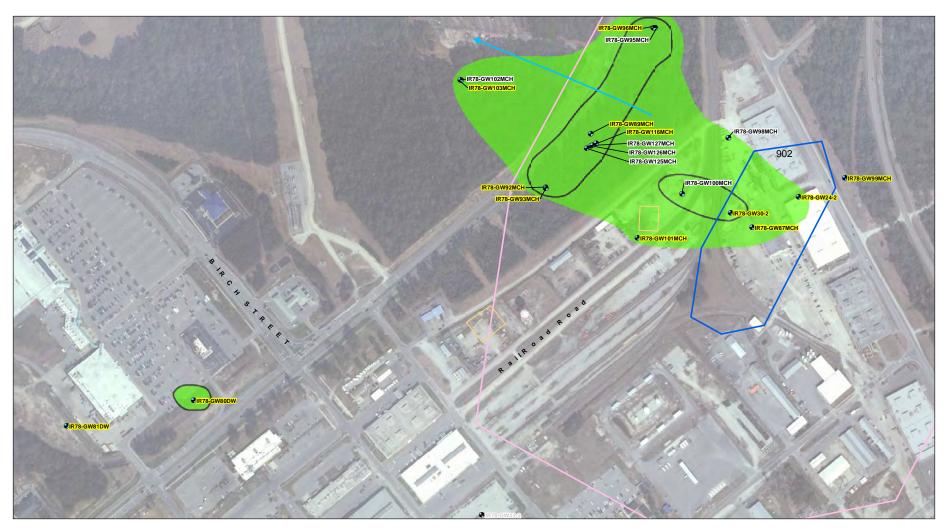
FIGURE 18

Site 78 North - Current and Proposed LTM Wells - Upper Castle Hayne Aquifer Site 78 Technical Memorandum MCIEAST-MCB CAMLEJ North Carolina





Current LTM Network (2013)



Proposed LTM Network (2014)

- Monitoring WellMonitoring Well not sampled

Land Use Control Boundaries

- Aquifer Use Control Boundary Non-Industrial Use Control Boundary
- Intrusive Activities Control Boundary (Groundwater)

Extent of VOC Detection

Extent of VOC Exceedance of NCGWQS

Notes:

- Data collected from September 2011 to May 2012
- Wells highlighted in yellow are included in long-term monitoring program
 The LTM network will be re-evaluated pending MILCON
- completion to determine if additional wells are needed to monitor VOCs

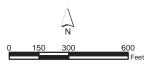
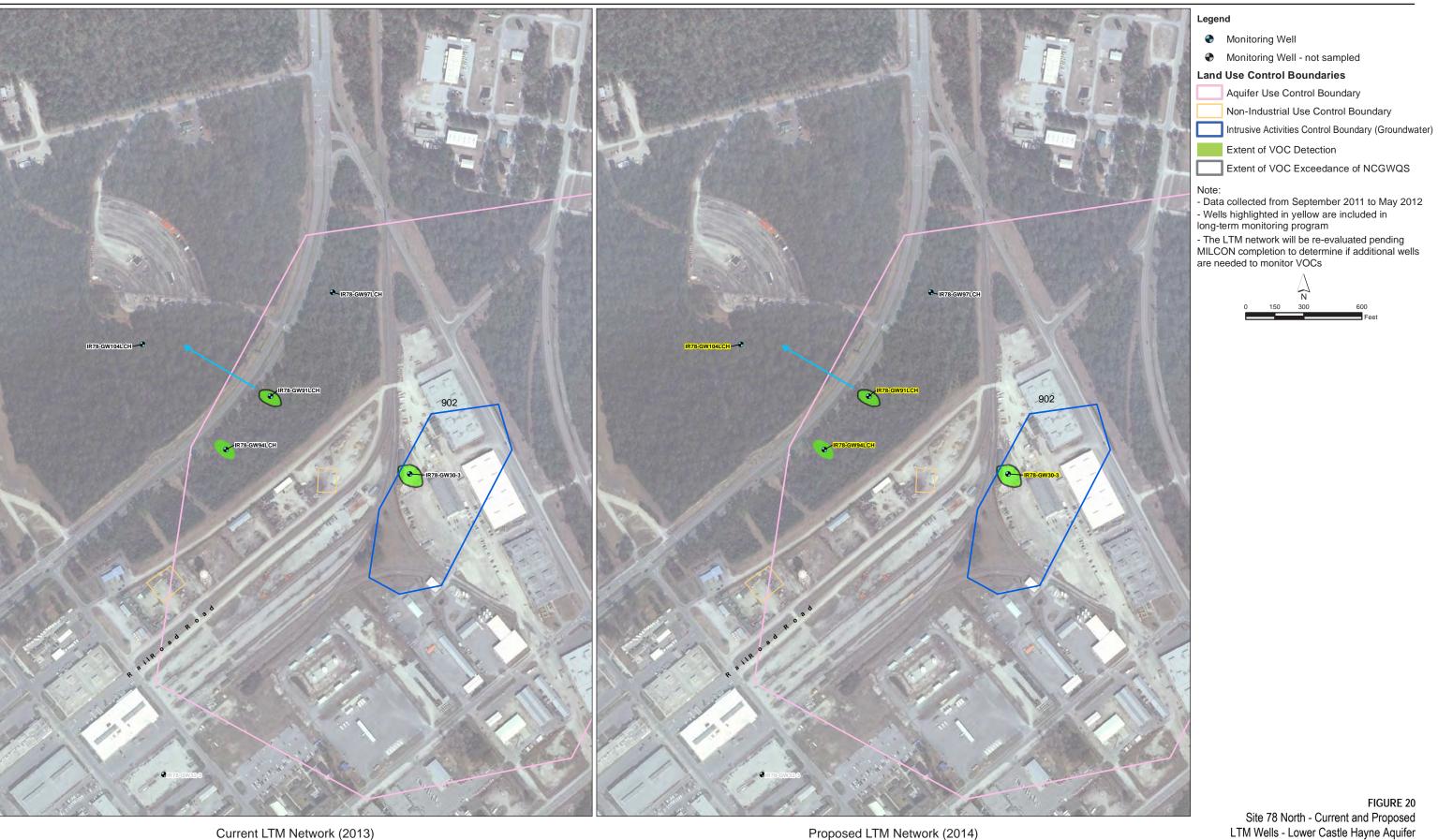


FIGURE 19 Site 78 North - Current and Proposed LTM Wells - Middle Castle Hayne Aquifer Site 78 Technical Memorandum MCIEAST-MCB CAMLEJ North Carolina





Current LTM Network (2013)

FIGURE 20 Site 78 North - Current and Proposed LTM Wells - Lower Castle Hayne Aquifer Site 78 Technical Memorandum MCIEAST-MCB CAMLEJ North Carolina

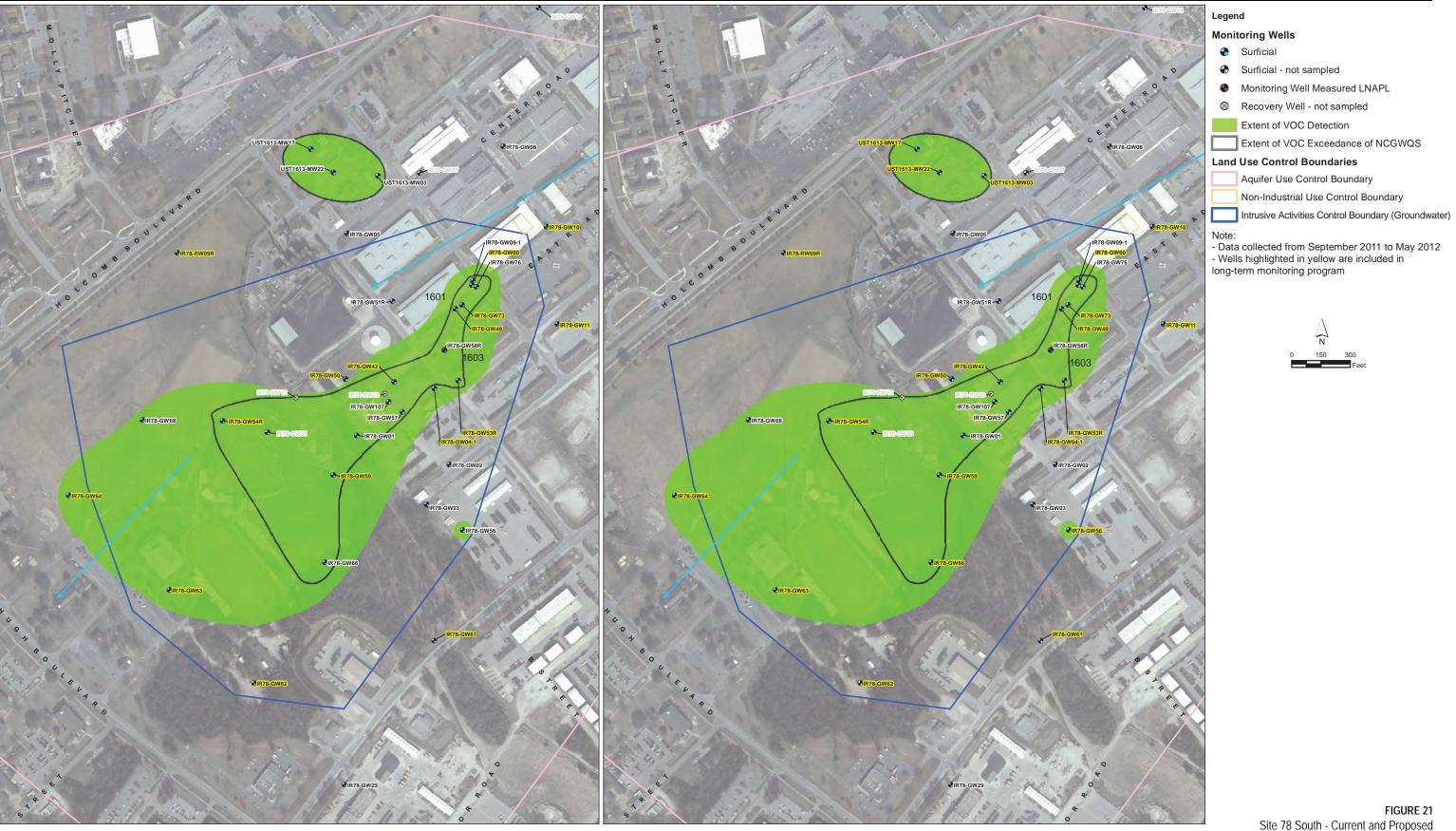
Aquifer Use Control Boundary

Extent of VOC Detection

Non-Industrial Use Control Boundary

Extent of VOC Exceedance of NCGWQS





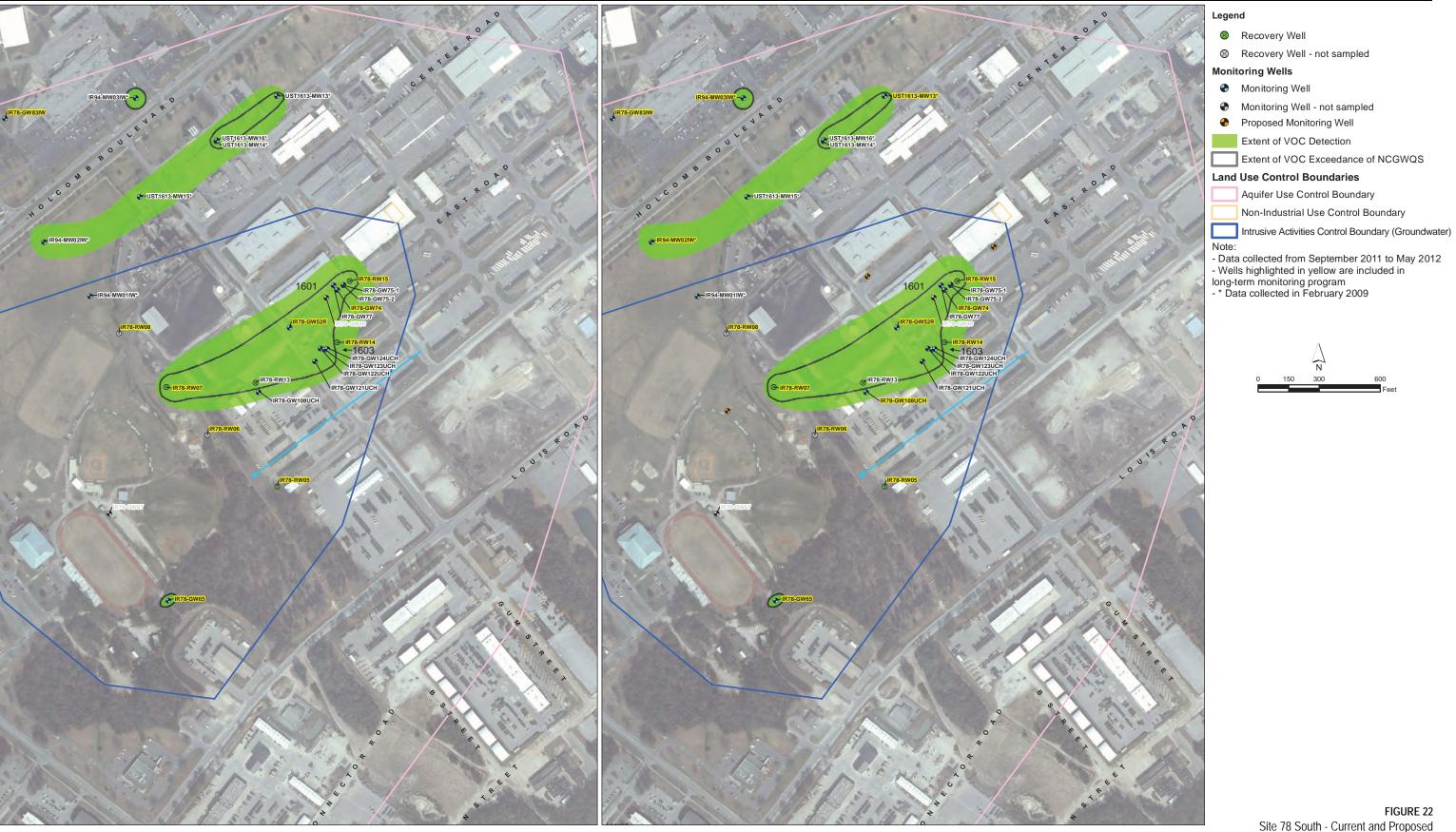
Site 78 South - Current and Proposed LTM Wells - Surficial Aquifer Proposed LTM Network (2014)

Site 78 Technical Memorandum MCIEAST-MCB CAMLEJ

North Carolina CH2MHILL.

FIGURE 21

Current LTM Network (2013)



Current LTM Network (2013) Proposed LTM Network (2014)

FIGURE 22 Site 78 South - Current and Proposed LTM Wells - Upper Castle Hayne Aquifer Site 78 Technical Memorandum MCIEAST-MCB CAMLEJ North Carolina

Extent of VOC Exceedance of NCGWQS

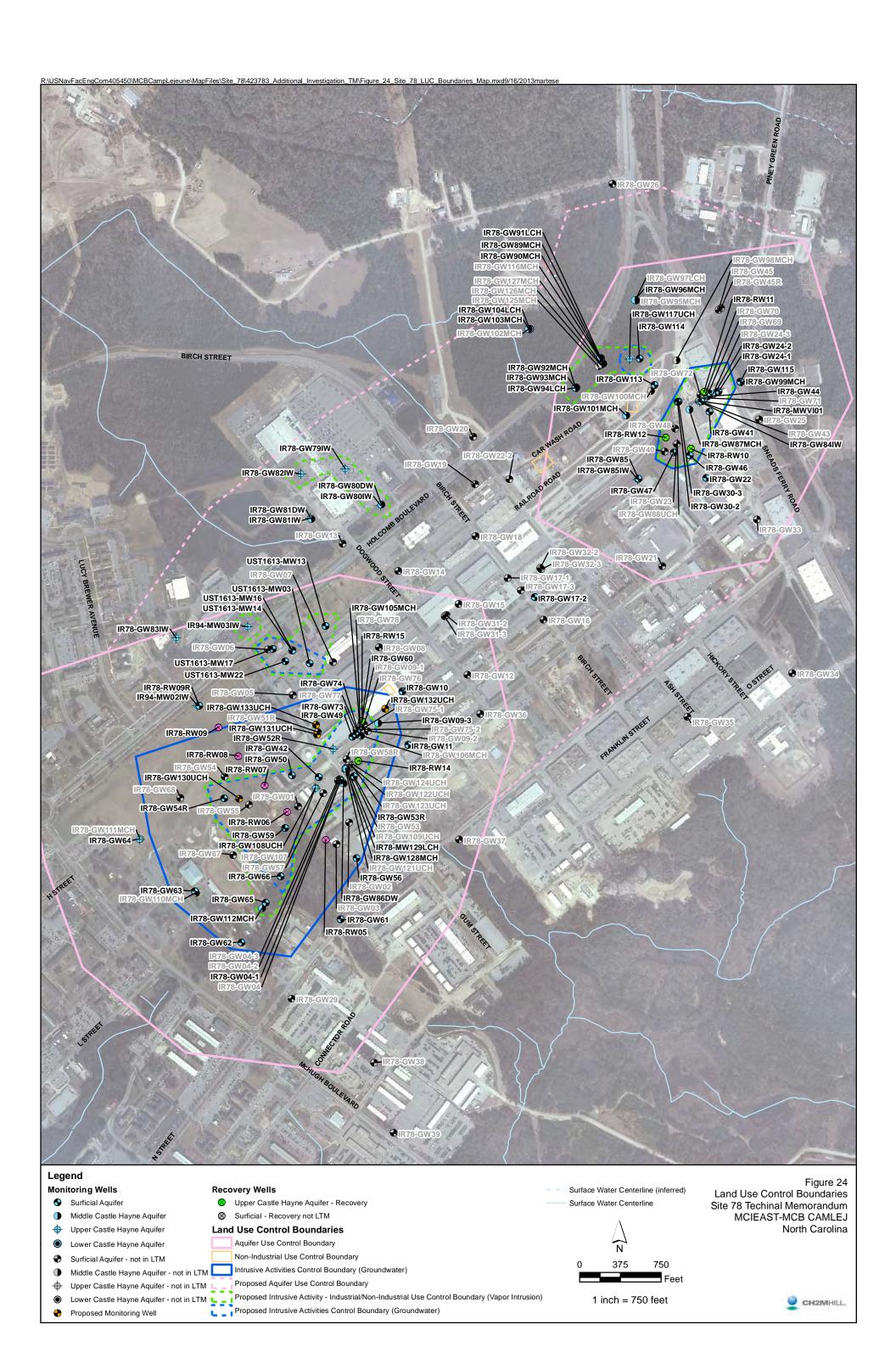
Aquifer Use Control Boundary Non-Industrial Use Control Boundary





FIGURE 23 Site 78 South - Current and Proposed LTM Wells - Middle Castle Hayne Aquifer Site 78 Technical Memorandum MCIEAST-MCB CAMLEJ North Carolina









PROJECT NUMBER:	BORING NUMBER:
403377.FI.WI	IR78GW84IW

IR78GW84IW

SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC	PROJECT: Site 78 LTM	LOCATION: Hadnot Point, MBC Camp Lejeune, NC	
FLEVATION : 29 09 ft abo	ove sea level	DRILLING CONTRACTOR : ARM	

EAST, NORTH (UTM Z18 NAD83, meters): 286712.52, 3839528.18 DRILLING METHOD AND EQUIPMENT: Hollow Stem Auger with Mud Rotary WATER LEVEL: 10.42 ft BTOC (9/18/2011) START: 2/15/2011 END: 2/15/2011 LOGGER : S.Kline/RDU DEPTH BELOW ROUND SURFACE SOIL DESCRIPTION COMMENTS WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM INTERVAL (ft) RECOVERY (inches) SAMPLE TYPE COLOR, (mdd) GRAPHIC Surface Completion: DEPTH OF CASING, DRILLING MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, DENSITY OR TESTS, & INSTRUMENTATION CONSISTENCY, SOIL STRUCTURE, MINÉRALOGY 0.0 SILTY SAND (SM)
Black- brown, damp, medium dense, fine grained, sand with silt, Stained HA-1 60 0.1 sand under slab. -light gray, very dense. SANDY SILT (ML) Light gray, damp. 5 5.0 SAND (SP)
White, wet, dense, fine grained, quartz ST-1 24 0 10 10.0 SILTY SAND (SM) Dark gray, wet, loose, very fine grained. 0 SS-1 24 No Recovery. 15 15.0 SILT (ML) Dark gray- brown, moist, stiff. SS-2 24 0.1 -damp, wood pieces. No Recovery. 20_ SILT (ML)
Dark gray- brown, damp. 20.0 SS-3 24 0 No Recovery. 25 SAND (SM)
Gray, wet, medium dense, fine grained. 25.0 SS-4 24 0 No Recovery. 30

(soil description on next page)



PROJECT NUMBER: BORING NUMBER: 403377.FI.WI IR78GW84IW SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 LTM LOCATION : Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 29.09 ft above sea level DRILLING CONTRACTOR : ARM

	•			•				Hollow Stem Auger with Mud Ro		
_	.EVEL: 10	0.42 ft BTC	OC (9/18/2	l	STA	RT: 2/15/2011 EN SOIL DESCRIPTION	ND: 2/15/2011	LOGGER :	S.Kline/RDU WELL	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DE RA	EPTH OF CASING, DRILLING ATE, DRILLING FLUID LOSS, STS, & INSTRUMENTATION	WELL DIAGRA Surface Completio Flush	M
-	SS-5	30.0	24	0		SAND (SW) Gray, wet, dense, cemented clasts with shells. No Recovery.				
35	-	35.0				SAND (SW) Gray, wet, dense, cemented clasts with shells.				
40	SS-6	40.0	60	0.1		-decrease to very loose sands.				
-40	MR	45.0	60	NM		SAND (SP) Gray, wet, loose, fine grained, sand with shell fragments.	Begin muc	I rotary at 37'		
50_	SS-7	45.0	60	NM						
55_	SS-8	50.0	60	NM						
60_	SS-9	55.0	60	NM			-	lod to CO Olbres to a 1		
	1					(soil description on next page)	Boring drill	led to 60.0' bgs to set well.		_



PROJECT NUMBER:	BORING NUMBER:					
403377 FI WI	IR78GW84IW	SHEET	3	OF	3	

CLIENT: NAVFAC PROJECT: Site 78 LTM LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 29.09 ft above sea level DRILLING CONTRACTOR : ARM

EAST, NORTH (UTM Z18 NAD83, meters): 286712.52, 3839528.18 DRILLING METHOD AND EQUIPMENT: Hollow Stem Auger with Mud Rotary

					712.52, 3	3839528.18	DRILLING METHO	D AND EQUIP	MENT: Hollow S	stem Auger with Mud Rot				
WATER LI	EVEL: 10	.42 ft BTC	OC (9/18/2	2011)	STA	RT: 2/15/2011		END: 2/15			S.Kline/RDU			
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAMI MOISTUI CONSISTI	DIL DESCRIPTION E, USCS GROUP SYI COLOR, RE CONTENT, RELA' DENSITY OR ENCY, SOIL STRUCT MINERALOGY	ΓIVE	DEPTH OF (RATE, DRIL	OMMENTS CASING, DRILLING LING FLUID LOSS, ISTRUMENTATION	WELL DIAGRAM Surface Completion: Flush			
65						Abbreviations bgs - below g BTOC- below ft - feet HA - Hand Au in - inch NM - Not Mea	round surface top of casing uger assured appled anization detector				- - - - - - - - - - - - - - - - - - -			
75											- - - - - - - - - - -			
80											- - - - -			
85 - - -											- - - - - - -			
90								- - - - - - - -			- - - - - -			



PROJECT NUMBER:	BORING NUMBER:					
403377.FI.WI	IR78GW85	SHEET	1	OF	1	

CLIENT: NAVFAC PROJECT: Site 78 LTM LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.12 ft above sea level DRILLING CONTRACTOR : ARM

EAST, NORTH (UTM Z18 NAD83, meters): 286539.64, 3839312.54 DRILLING METHOD AND EQUIPMENT: Hollow Stem Auger

	-					3839312.54	DRILLING METHOD AN	ID E	UIPMENT: Hollow		
	.EVEL: 7.	.89 ft BTO	C (9/18/20	11)	STA	RT: 2/14/2011		ND:	2/14/2011		R : S.Kline/RDU
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAMI MOISTUI	DIL DESCRIPTION E, USCS GROUP SYMBOI COLOR, RE CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE MINERALOGY		DEPTH OF RATE, DR	COMMENTS F CASING, DRILLING ILLING FLUID LOSS, INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
- - - - - - - 5	HA-1	5.0 5.0	60	0		stiff, fine grain -dark gray. CLAY (CL) Light gray with	Y (SC) h brown streaking, damp,	- - - -			
- - -	ST-1	7.0	24	0		-saturated.		- - - - -			
10 	SS-1	10.0	24	0		-gray, increas	sing silt content with depth	- - - - - - - -			
15 15 - - - -	SS-2	15.0	30	0		silt with fine g	ack, damp, low stiffness, rained sand, organics	- - - - -	Boring drilled to 17	7.0' bgs to set well.	
20						present. No Recovery. SILT (ML) Dark gray- bla	ack, damp, low stiffness,	/ 			<u>-</u>
25						present. End of Boring Abbreviations bgs - below g BTOC- below ft - feet HA - Hand Au in - inch NM - Not Mea NS - Not Sam	round surface top of casing uger asured apled onization detector				- - - - - - - - - - - - - - - - - - -
30	-							_			



PROJECT NUMBER:	BORING NUMBER:				
403377.FI.WI	IR78GW85IW	SHEET	1	OF	3

 CLIENT: NAVFAC
 PROJECT: Site 78 LTM
 LOCATION: Hadnot Point, MBC Camp Lejeune, NC

 ELEVATION: 26.58 ft above sea level
 DRILLING CONTRACTOR: ARM

FAST_NORTH (LITM 718 NAD83 meters) : 286537 63 3839310 30 DRILLING METHOD AND EQUIPMENT : Hollow Stem Auger with Mud Rotary

EAST, NORTH (UT	<u>M Z18 NA</u>	<u>D83, met</u>	ers): 286	<u>537.63, 3</u>	3839310.30	DRILLING METHOD A	AND EC	<u> UIPMENT : H</u>	ollow Stem Aug	er with Mud Rot	ary	
WATER LEVEL: 11	.58 ft BTO	C (9/18/2	011)	STA	RT: 2/16/2011		END: 2	2/16/2011			S.Kline/RDU	
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE	SOIL NAME, USCS GROUP SYN COLOR, MOISTURE CONTENT, RELAT DENSITY OR DENSITY OR CONSISTENCY, SOIL STRUCTI		COLOR, RE CONTENT, RELATIVI DENSITY OR	Ē .	RATE	COMMEN TH OF CASING, E, DRILLING FL S, & INSTRUM	, DRILLING UID LOSS,	WELL DIAGRA Surface Completion Stick up	AΜ			
- - - - - - - 5	5.0	60	0		SAND (SP) Dark brown, s CLAY (SC) Light gray, da sandsaturated.	surface sod. mp, stiff, fine grained	1					
10	5.0											
SS-1	12.0	18	0		SILTY SAND Dark gray, sar grained sand No Recovery.	turated, low density, fine with silt.	; - - - - -					-
15	15.0	24	0		SILTY SAND Dark gray, sar grained sand No Recovery.	turated, low density, fine with silt.	- - - - -					-
							-					1
20 - - - - - -	20.0	24	0		grained sand, SILTY SAND	wet, medium density, fi with silt.						-
25							-					1
SS-4	25.0	12	0		SAND (SP) Dark gray- bla	ack, loose, fine grained.						-
30					-limestone, ce	emented sand and grave	- - el					-



PROJECT NUMBER:	BORING NUMBER:				
403377.FI.WI	IR78GW85IW	SHEET	2	OF	3

CLIENT: NAVFAC PROJECT: Site 78 LTM LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 26.58 ft above sea level DRILLING CONTRACTOR: ARM

EAST, NORTH (UTM Z18 NAD83, meters): 286537.63, 3839310.30 DRILLING METHOD AND EQUIPMENT: Hollow Stem Auger with Mud Rotary

EAST, IN	JRTH (U	1M Z18 NA	AD83, mei	(ers) : 286	537.63, 3	8839310.30	DRILLING METHOL	LLING METHOD AND EQUIPMENT : Hollow Stem Auger with Mud Rotary				
WATER L	EVEL: 11	1.58 ft BTC	C (9/18/2	011)	STA	RT: 2/16/2011		END: 2	2/16/2011		S.Kline/RDU	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAMI MOISTUI CONSISTI	OIL DESCRIPTION E, USCS GROUP SYM COLOR, RE CONTENT, RELATI DENSITY OR ENCY, SOIL STRUCTL MINERALOGY	VE	RATE, D	COMMENTS OF CASING, DRILLING PRILLING FLUID LOSS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up	
35	MR-1	35.0	60	0			ack, loose, fine graine	d	Mud rotary from	30 to 60' bgs		
- - - - - - 40	MR-2	35.0	60	NM		-hard, cemen	ted layer.				-	
- - - - - - - 45_	MR-3	45.0	60	NM								
- - - - - - 50	MR-4	45.0	60	NM		SAND (SW) Gray, wet, lov partially ceme clasts and silt	v to medium dense, ented sand with limeso	otne				
- - - - - - - 55	MR-5	55.0	60	NM								
- - - - - - - 60_	MR-6	60.0	60	NM		(soil description	on on next page)	- - - - - -				



PROJECT NUMBER:	BORING NUMBER:					
403377.FI.WI	IR78GW85IW	SHEET	3	OF	3	

CLIENT: NAVFAC PROJECT: Site 78 LTM LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 26.58 ft above sea level DRILLING CONTRACTOR : ARM

EAST, NORTH (UTM Z18 NAD83, meters): 286537.63, 3839310.30 DRILLING METHOD AND EQUIPMENT: Hollow Stem Auger with Mud Rotary

						3839310.30				low Stem Auger with Mu		
WATER L	EVEL: 11	.58 ft BTC	OC (9/18/2	011)	STA	RT: 2/16/2011		END: 2	2/16/2011		ER : S.Kline	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME MOISTUF CONSISTE	IL DESCRIPTION E, USCS GROUP SYMBO COLOR, RE CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE MINERALOGY		RATE,	COMMENTS OF CASING, DRILLING DRILLING FLUID LOSS , & INSTRUMENTATION	;	WELL DIAGRAM Surface Completion: Stick up
						End of Boring	Log at 60' bgs	\neg				_
65						Abbreviations: bgs - below gr BTOC- below ft - feet HA - Hand Au in - inch NM - Not Mea NS - Not Sam	ound surface top of casing ger sured pled nization detector	-				- - - - - - - - - - - - - - - - - - -
70 								-				- - - - - -
75 - - - - - -												- - - - - - -
80								- - - - - - -				- - - - - - - -
85 												-
90												- - - -



PROJECT NUMBER:	BORING NUMBER:				
403377.FI.WI	IR78GW86DW	SHEET	1	OF	4

CLIENT: NAVFAC PROJECT: Site 78 LTM LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.49 ft above sea level DRILLING CONTRACTOR : ARM

EAST, N	ORTH (U	TM Z18 NA	AD83, met	ters) : 285	713.99, 3	3838457.03 DRILLING METHOD AND EC	QUIPMENT: Hollow Stem Auger		
WATER	_EVEL: 17	7.74 ft BTC	OC (9/17/2	011)	STA	RT: 2/16/2011 END:	2/16/2011 LOGGER :	S.Kline/RDU	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush	
5_	HA-1	5.0	60	0		SURFACE SOD (PT) SAND (SP) Light gray, dry, loose, fine grained, trace silt. -orange- brown, saturated.			
	ST-1	7.0	12	0		SILTY SAND (SM) Medium gray, wet, loose, fine grained, sand with silt.			
10_	SS-1	10.0	6	1.4					
15_	SS-2	15.0	24	0		SANDY SILT (ML) Medium to dark gray, moist, soft with medium plasticity, fine grained sand. No Recovery.			
20	SS-3	20.0	18	0		SAND (SW) Light brown- gray, wet, medium dense, fine to very coarse sand, cemented sand and gravel with shell fragments. No Recovery.			
25	SS-4	25.0	6	0		SAND (SW) Light brown- gray, wet, dense, fine to very coarse sand, cemented sand and gravel with shell fragments.			



PROJECT NUMBER:	BORING NUMBER:		
403377.FI.WI	IR78GW86DW	SHEET	2

CLIENT: NAVFAC PROJECT: Site 78 LTM LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.49 ft above sea level DRILLING CONTRACTOR : ARM

EAST, NORTH (UTM Z18 NAD83, meters): 285713.99, 3838457.03 DRILLING METHOD AND EQUIPMENT: Hollow Stem Auger

WATER L						3838457.03 RT: 2/16/2011	DRILLING WET	END: 2/16/2	MENT: Hollow Stem Aug 2011	LOGGER :	S Kline/RD	IJ
DEPTH BELOW GROUND SURFACE (ft)				1		so	IL DESCRIPTION		COMMEN		WI	ELL
:LOW	ш	, AL	RECOVERY (inches)	N N	Pol	SOIL NAME	E, USCS GROUP S	YMBOL,			DIAG	SRAM
H BE D SU	SAMPLE TYPE	INTERVAL (ft)	30VE	CREEN (ppm)	일	MOISTUF	COLOR, RE CONTENT, REL	ATIVE	DEPTH OF CASING RATE, DRILLING FL	, DRILLING	Surfa	ce oletion: I
OUN	SA T	Ē	REC (ji	PID SCREENING (ppm)	GRAPHIC LOG	CONSISTE	DENSITY OR ENCY, SOIL STRU	CTURE.	TESTS, & INSTRUM	IENTATION	Flush	1
G S		/		Δ.			MINERALOGY	,			N//X	IX / / /
-		30.0				SAND (SW) Light brown- g	gray, wet, dense, f	ne to				
-		$ \setminus / $				very coarse sa gravel with sh	and, cemented sai	nd and				
-	SS-5		60	NM		graver with sir	eli iraginienis.	-				
] -]	$ \ / \ $						7				
_		/										
35		35.0 35.0						_				
-		$\left \left \right \right $										
-		$ \setminus / $						-				
-		\						1				
-	SS-6	/\	60	NM				-				
-		/						1				
40		40.0						-				
_		40.0						7				
_		$ \setminus / $										
-		$ \setminus / \mid$						4				
_	SS-7	X	60	NM								
-		$ \ / \ $						-				
		/\						1				
45		45.0 45.0						-				
-		\						1				
-	-	$ \setminus / $										
-	SS-8	X	60	NM				7				
-	33-0	$ \ / \ $	00	INIVI								
-		$ \cdot $						-				
50		50.0										
-		50.0						-				
] -		$ \setminus / $										
1 -												
-	SS-9	/\	60	NM				-				
] -		$ \ /\ \ $						1				
55		55.0						+				
-		55.0						7				
-		$ \setminus / $						-				
1 -		$ \setminus / $						1				
1 -	SS-10		60	NM								
1 -		$\mid / \setminus \mid$]				
		/										
60		60.0 60.0						-				
								7				



PROJECT NUMBER:	BORING NUMBER:
403377.FI.WI	IR78GW86DW

SHEET 3 OF 4

CLIENT: NAVFAC PROJECT: Site 78 LTM LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR : ARM ELEVATION: 28.49 ft above sea level

EAST, NORTH (JTM Z18 N	AD83, me	ters) : 285	713.99, 3	8838457.03	DRILLING METHOD	AND EC	QUIPMENT: Hollow Stem	Auger		
WATER LEVEL:	17.74 ft BTC	OC (9/17/2	2011)	STA	RT: 2/16/2011		END:	2/16/2011	LOGGER:	S.Kline/RDl	J
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHICLOG	SOIL NAMI MOISTUI CONSISTI	IIL DESCRIPTION E, USCS GROUP SYME COLOR, RE CONTENT, RELATIV DENSITY OR ENCY, SOIL STRUCTU MINERALOGY	/E	COMI DEPTH OF CAS RATE, DRILLING TESTS, & INSTF	G FLUID LOSS,	DIAG	ELL GRAM ce oletion:
SS-11	65.0	60	NM		SAND (SW) Light brown- overy coarse signavel with sh	gray, wet, dense, fine tand, cemented sand a lell fragments.	o - nd - - -				
SS-12	65.0	60	NM				- - - - - -				
- - - - SS-13	75.0	60	NM		SANDY CLA' Medium gray, occasional ce	Y (SC) soft to very soft, mented clasts.	- - - - - -				
SS-14	80.0	60	NM				- - - - - - -				
- - - - SS-1!	85.0	60	NM		SAND (SW) Gray, wet, de	nse, cemented layers v	- - - - - - vith				
SS-16	90.0	60	NM		intermittent fir shell fragmen	ne sand, gravel clasts a	and _ - - - - - - -				
	90.0						-				



PROJECT NUMBER:	BORING NUMBER:		
403377 FI WI	IR78GW86DW	QUEET	4 OF 4

CLIENT: NAVFAC PROJECT: Site 78 LTM LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.49 ft above sea level DRILLING CONTRACTOR : ARM

EAST, NORTH (UTM Z18 NAD83, meters): 285713.99, 3838457.03 DRILLING METHOD AND EQUIPMENT: Hollow Stem Auger

	-			•		3838457.03	DRILLING METHOD A	AND EC	QUIPMENT: Hollo			
WATER L	.EVEL: 17	7.74 ft BTC	OC (9/17/2	011)	STA	RT: 2/16/2011		END:	2/16/2011		GER : S.K	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME MOISTUR CONSISTE	L DESCRIPTION , USCS GROUP SYMBO COLOR, E CONTENT, RELATIV DENSITY OR NCY, SOIL STRUCTUR MINERALOGY	E	RATE, D	COMMENTS DF CASING, DRILLIN RILLING FLUID LOS INSTRUMENTATIO	S,	WELL DIAGRAM Surface Completion: Flush
- - - - 95	SS-17	95.0	60	NM		Gray, wet, den intermittent fine shell fragments	se, cemented layers w e sand, gravel clasts and s.	rith _ nd _ -				
	SS-18	95.0	60	NM		SAND/GRAVE cemented sand shell fragments	d & gravel, abundant	- - - - - -				
100		/100.0 \				End of Boring I Abbreviations: bgs - below gro BTOC- below t ft - feet HA - Hand Aug in - inch NM - Not Meas NS - Not Samp PID - photo ion	ound surface op of casing ger sured	- - - - - -	Boring drilled to	100.0' bgs to set we	ell.	
110						S - Sonic Run						- - - - - - - - -
115												- - - - - - - -
120 - - - 120 - -								- - - - -				- - - - - -



30

PROJECT NUMBER: **BORING NUMBER:** 423783.FI.WI IR78GW87-MCH SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR: Miller Drilling of Nashville TN ELEVATION: 29.03 ft above sea level

DRILLING METHOD AND EQUIPMENT: VersaSonic Rig, 6-in casing EAST, NORTH (UTM Z18 NAD83, meters): 286683.38, 3839506.25 WATER LEVEL: 11.4 ft BTOC (9/16/2011) END: 7/27/2011 LOGGER: A.Guilfoyle/CLT START: 7/27/2011 DEPTH BELOW ROUND SURFACE COMMENTS SOIL DESCRIPTION WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM RECOVERY SAMPLE TYPE INTERVAL (inches) COLOR, (mdd) GRAPHIC Surface Completion: ŧ DEPTH OF CASING, DRILLING MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, DENSITY OR TESTS, & INSTRUMENTATION CONSISTENCY, SOIL STRUCTURE, MINERALOGY SAND (SP) Brown, dry, loose, fine to medium 0.0 grained, trace silt. HA-1 60 6.7 5.0 5.0 -mottled with greenish gray and black staining, petroleum odor. S1 48 32.7 SILTY SAND (SM) Brown with black staining, moist, 9.0 medium dense, cohesive, strong 9.0 petroleum odor. 10 -wet. **CLAYEY SAND (SC)** Brown with black staining, wet, medium plastic, soft, cohesive. SAND (SP)
Gray, moist, loose, fine to medium grained, petroleum odor. 527.4 S2 117 SILTY SAND (SM)
Gray, wet, medium dense, cohesive, 15 fine to medium grained, petroleum odor. 19.0 No Recovery. 19.0 20 SANDY SILT (ML)
Dark gray, wet, soft, cohesive, very fine sands, trace clay, no odor. SANDY CLAY (CL)
Black, dry, low plasticity, medium stiff, S3 78 5 25 large wood debris. SAND (SW) Light greenish gray, moist, loose to medium dense, very fine to medium grained. -very dark gray. 29.0 29.0 SILTY SAND (SM)

Dark gray, wet, loose, very fine to

medium grained.



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI

IR78GW87-MCH

SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR: Miller Drilling of Nashville TN ELEVATION: 29.03 ft above sea level

EAST, NORTH (UTM Z18 N	IAD83, me	ters) : 286	683.38, 3	8839506.25 DRILLING METHOD AND EC	QUIPMENT: VersaSonic Rig, 6-in casing	
WATER LEVEL: 11.4 ft BTC	C (9/16/20		STA		7/27/2011 LOGGER:	A.Guilfoyle/CLT
DEPTH BELOW GROUND SURFACE (f) SAMPLE TYPE INTERVAL (f)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
35_ S4 39.0	120	0.7		SAND (SW) Dark gray, moist, loose, medium dense, very fine to medium grained, trace silt. -light greenish gray, very fine to coarse, large fragments of shelly cemented sand.		
40	100	0.5		CLAYEY SAND (SC) Light greenish gray, wet, loose, few to little fragments of cemented shelly sand. SILTY SAND (SM) Greenish gray, wet, medium dense, few to little fragments of cemented shelly sand. SAND (SW) Light greenish gray, moist, loose, medium dense, very fine to coarse, large fragments of shelly cemented sand. SILTY SAND (SM) Greenish gray, wet, medium dense,		
50	116	2		trace fragments of cemented shelly sand. SILTY SAND (SM) Greenish gray, wet, medium dense, cemented sand, trace shells. SAND (SW) Dark gray, moist, loose, very fine to medium grained.		
60				No Recovery. (soil description on next page)	8-in temporary casing installed to 60 feet bgs	



PROJECT NUMBER:	BORING NUMBER:			_
423783 FI WI	IR78GW87-MCH	CHEET	3 OE 3	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR: Miller Drilling of Nashville TN ELEVATION: 29.03 ft above sea level DRILLING METHOD AND EQUIPMENT: VersaSonic Rig, 6-in casing EAST, NORTH (UTM Z18 NAD83, meters) : 286683.38, 3839506.25 WATER LEVEL: 11.4 ft BTOC (9/16/2011) START: 7/27/2011 END: 7/27/2011 LOGGER: A.Guilfoyle/CLT DEPTH BELOW
GROUND SURFACE
(ft) SOIL DESCRIPTION COMMENTS WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM INTERVAL (ft) SAMPLE TYPE (inches) COLOR, (mdd) GRAPHIC Surface Completion: DEPTH OF CASING, DRILLING MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, DENSITY OR TESTS, & INSTRUMENTATION CONSISTENCY, SOIL STRUCTURE, MINÉRALOGY SILTY SAND (SM) Dark gray, moist, dense, gravel-sized shell fragments. SAND (SW)
Gray, wet, very dense, very fine to medium grained, highly cemented. S7 108 0 65 SAND (SW) 69.0 No Recovery. 69.0 70 SAND (SW) Gray, wet, very dense, very fine to medium grained, highly cemented. SAND (SW) Gray, moist, loose, very fine to medium grained. 109 75 S8 1.5 80 80.0 End of Boring Log at 80' bgs Abbreviations: Boring drilled to 81.0' bgs to set well. bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured 85 NS - Not Sampled PID - photo ionization detector S - Sonic Run 90



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW88-UCH SHEET 1 OF 2

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.96 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286649.63, 3839409.89 DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing

				•			RILLING METHOD AND	EQUIPME	NT: Mite-e-Sonic Rig, 6-in casing	
	.EVEL: 10	0.09 ft BTC	OC (9/16/2	(011)	STA	RT: 8/2/2011		D: 8/2/2011		: J.Albano/CLT
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, US (MOISTURE C DEI CONSISTENC)	ESCRIPTION CCS GROUP SYMBOL, COLOR, ONTENT, RELATIVE NSITY OR /, SOIL STRUCTURE, ERALOGY		COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
- - - - - - - - -	HA-1	5.0	60	0.2		SAND (SP) Tan and orange. SILT (ML) Dark brown, moist pieces, strong asp	, loose, some asphalt halt smell.			
- - - - - - 10	S1	10.0	60	1.8		grained sand. SILTY SAND (SM	bist, loose, very fine i, loose, fine to very	-		
15		10.0				SAND (SP) Medium gray to moloose, fine to very	edium tan, moist, fine grained sand.			
20	S2		180	0		fine to very fine gra	moist, medium stiff,			
25						SAND (SP) Medium gray to me loose, fine to very	edium tan, moist, fine grained sand.			
30	-	30.0								



60

PROJECT NUMBER:	BORING NUMBER:					
423783 FLWI	IR78GW88-LICH	SHEET	2	ΩF	2	

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.96 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing EAST, NORTH (UTM Z18 NAD83, meters): 286649.63, 3839409.89 WATER LEVEL: 10.09 ft BTOC (9/16/2011) START: 8/2/2011 END: 8/2/2011 LOGGER: J.Albano/CLT DEPTH BELOW
GROUND SURFACE
(ft) SOIL DESCRIPTION COMMENTS WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, RECOVERY (inches) DIAGRAM INTERVAL (ft) SAMPLE TYPE COLOR, (mdd) GRAPHIC Surface Completion: DEPTH OF CASING, DRILLING MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, DENSITY OR CONSISTENCY, SOIL STRUCTURE, TESTS, & INSTRUMENTATION MINÉRALOGY 30.0 SAND (SP) Light gray, moist, very fine grained sand, sandy limestone, some shell 35 S3 108 0.5 40 40.0 End of Boring Log at 40' bgs Abbreviations: Boring drilled to 41.0' bgs to set well. bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured 45 NS - Not Sampled PID - photo ionization detector S - Sonic Run 50 55



PROJECT NUMBER: **BORING NUMBER:** 423783.FI.WI

IR78GW89-MCH

SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR: Miller Drilling of Nashville TN

ELEVATION: 27.12 ft above sea level DRILLING METHOD AND EQUIPMENT: VersaSonic Rlg, 6-in casing EAST, NORTH (UTM Z18 NAD83, meters): 286433.50, 3839650.42 WATER LEVEL: 14.6 ft BTOC (9/16/2011) START: 9/1/2011 END: 9/1/2011 LOGGER: A.Guilfoyle/CLT DEPTH BELOW SROUND SURFACE SOIL DESCRIPTION COMMENTS WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL. DIAGRAM RECOVERY (inches) SAMPLE TYPE INTERVAL COLOR, (mdd) GRAPHIC Surface Completion: ŧ DEPTH OF CASING, DRILLING € MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION DENSITY OR Stick up CONSISTENCY, SOIL STRUCTURE, MINÉRALOGY SAND (SP)
Dark grayish brown, slightly moist, 0.0 medium dense, very fine to fine grained. HA-1 60 NM Lithology from 0-60' taken from IR78GW91-LCH -yellowish brown mottled with pale brown. 5 5.0 SILTY SAND (SM) very fine to medium grained, trace clay. SAND (SP)
Yellowish brown, dry, loose to medium S1 37 NM dense. 10 10.0 No Recovery. 10.0 15 S2 60 NM SAND (SW) Light gray, wet, loose, fine to coarse grained. SANDY SILT (ML) Light gray mottled with yellow, moist, firm, increase in sand content with depth, trace wood debris. 20 20.0 20.0 SAND (SW) Light gray to white, wet, loose, no silt. No Recovery. 25 S3 12 NM 30 30.0

(soil description on next page)



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW89-MCH
SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.12 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286433.50, 3839650.42 DRILLING METHOD AND EQUIPMENT: VersaSonic RIg, 6-in casing

EAST, NOR	TH (UT	<u>rm Z18 N</u> A	AD83, me	ters) : 286	433.50, 3	3839650.42	DRILLING METHOD A	ND EQ	UIPMENT: Versas	Sonic RIg, 6-in casing		
	LEVEL: 14.6 ft BTOC (9/16/2011) START: 9/1/2011						END: 9	9/1/2011		LOGGER : A.Guilfoyle/		
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAM MOISTU CONSIST	DIL DESCRIPTION E, USCS GROUP SYMBO COLOR, RE CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE MINERALOGY		DEPTH OI RATE, DR	COMMENTS F CASING, DRILLING ILLING FLUID LOSS, INSTRUMENTATION	WE DIAG Surfar Comp Stick	
35	S4	40.0	96	NM		SAND (SW) Gray, loose, grainedlight gray.	very fine to coarse					
45_	S 5	50.0	120	NM		-pale olive wi fine to mediu	th iron oxide staining, vei im grained.	y -				
55_	S6	60.0	120	NM		SAND (SP) Pale olive wit mottled with o grained.	h brown mottled with tan se, very fine to coarse e clay. h iron oxide staining dark gray, loose, medium	- - - - -				
		60.0			 	(soil descripti	on on next page)	\neg				



PROJECT NUMBER:	BORING NUMBER:					
423783.FI.WI	IR78GW89-MCH	SHEET	3	OF	3	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.12 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

DRILLING METHOD AND EQUIPMENT: VersaSonic RIg, 6-in casing EAST, NORTH (UTM Z18 NAD83, meters): 286433.50, 3839650.42 WATER LEVEL: 14.6 ft BTOC (9/16/2011) START: 9/1/2011 END: 9/1/2011 LOGGER: A.Guilfoyle/CLT DEPTH BELOW
GROUND SURFACE
(ft) SOIL DESCRIPTION COMMENTS WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM INTERVAL (ft) RECOVERY (inches) SAMPLE TYPE COLOR, (mdd) GRAPHIC Surface Completion: DEPTH OF CASING, DRILLING MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, DENSITY OR Stick up TESTS, & INSTRUMENTATION CONSISTENCY, SOIL STRUCTURE, MINÉRALOGY SAND (SW) Light yellowish brown, medium dense to loose, very fine to medium grained. S7 60 0.4 65 65.0 No Recovery. 65.0 NS NM NM 70 70.0 End of Boring Log at 70' bgs Boring drilled to 70.0' bgs to set well. Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured 75 NS - Not Sampled PID - photo ionization detector S - Sonic Run 80 85 90



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW90-MCH

SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.14 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286432.10, 3839650.20 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 8-in casing to 90-ft, 6-in to 110-ft

	-			-		8839650.20	DRILLING METHOD			VersaSonic Rig; 8-in casing to 9		
WATER L	EVEL: 14 	1.4 π Β Ι Ο ((9/16/20		STAI	RT: 8/31/2011	DESCRIPTION	END: 8	8/31/2011	COMMENTS	: A.Guilfoyle/0 WE	
OW		یا ا	≿ _	PID SCREENING (ppm)	.0G	SOIL NAME.	USCS GROUP SYMB	OL,		COMMENTO	DIAG	
H BEL	SAMPLE	INTERVAL (ft)	RECOVERY (inches)	CREEN (ppm)	GRAPHIC LOG	MOISTURE	COLOR, CONTENT, RELATIV	/F	DE	EPTH OF CASING, DRILLING	Surfac	e l
H OND	SAN	NT O	ZECC (inc	d)	RAPI	[DENSITY OR		R/ TE	ATE, DRILLING FLUID LOSS, ESTS, & INSTRUMENTATION	Compl Stick u	letion: ip
DEPTH BELOW GROUND SURFACE (ft)			_	Ы	9	CONSISTEN	ICY, SOIL STRUCTUF IINERALOGY	₹Ε,		io io, a morriomenti interiori		
_		0.0				SAND (SP)		-				No.
-		$ \setminus / $				medium dense,	own, slightly moist, very fine to fine	-				
		$ \setminus / \mid$				grained.	,	_				
-	HA-1	X	60	NM				-	Lithology t	from 0-100' taken from		
	'"` '	$ \ / \ $	00	14101		-yellowish brow	n mottled with pale		IR78GW9	1-LCH		
_		/ \				brown.		-				
5_		5.0						-				
_		5.0				SILTY SAND (S	SM) lium grained, trace cl	-				
-						very line to med	ilulii grailleu, trace ci	ay				
_						CAND (CD)						
-	S1		37	NM		SAND (SP) Yellowish brown	n, dry, loose to mediu	m -				
						dense.		1				
-		\						-				
10		10.0										
-		10.0				No Recovery.		-				
		\										
-		\						_				
		\										
_		\						_				
-		\						-				
15		\	00	NINA		CAND (CM)						
-	S2	\	60	NM		SAND (SW) Light gray, wet,	loose, fine to coarse	-				
-		\				\grained.		7				
-		\				SANDY SILT (N	<u>и∟)</u> ed with yellow, moist,	_				
-		\				firm, increase in depth, trace wo	sand content with	1				
-		\				deptili, trace wo	od debris.	-				
-		\						1				
20		20.0				SAND (SW)						
-		\			::::::	Light gray to wh	ite, wet, loose, no silt	t				
-		\				No Recovery.		-				X//>
		\						_				
_		\						-				
		\										
25		\						_				
25_	S3	\	12	NM								
] -		\						7				
-		\						-				
] -		\						4				
-		\						-				
-		\						1				
30 -		30.0						-				
					::::::	(soil description	on next page)				> />	<i>Y/</i>



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI

IR78GW90-MCH

SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.14 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286432.10, 3839650.20 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 8-in casing to 90-ft, 6-in to 110-ft

								8/31/2011	VersaSonic Rig; 8-in casing to 9	: A.Guilfoyle/	
				RT: 8/31/2011 SOIL DESCRIP		0/31/2011	COMMENTS	WE			
DEPTH BELOW GROUND SURFACE (ft)	l I	7	₩ (PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, USCS GR	OUP SYMBOL.			DIAG	RAM
H BE SUI	SAMPLE	INTERVAL (ft)	RECOVERY (inches)	(ppm)	일	COLOR, MOISTURE CONTEN	T, RELATIVE	DEP	TH OF CASING, DRILLING	Surfac	ce Metion:
EPT SO SO NO SO NO SO NO SO NO SO NO SO NO SO NO SO NO SO NO SO NO SO NO SO NO SO NO SO NO SO NO SO NO SO NO SO NO SO NO SO SO SO SO SO SO SO SO SO SO SO SO SO	SAL	Ē	REC (jr	08 0	RAP.	DENSITY (CONSISTENCY, SOIL	DR I	TES	E, DRILLING FLUID LOSS, TS, & INSTRUMENTATION	Stick	oletion: up
GRC				₫		MINERALO	GY		· 		
_		30.0				SAND (SW) Gray, loose, very fine to c	narse				
-		\				grained.					
_		\				-light gray.	_				
		\					_				
_		\					-				
35		\					_				
_	S4	\	96	NM			-				
		\									
_		\					-				
-		\									
-		\					-				
		\									
40		40.0									
		\									
_		\ /					-				
_		\ /				-pale olive with iron oxide fine to medium grained.	staining, very				
-		\ /				ilile to medium grained.	-				
_		\					=				
45		V 1					_				
_	S5	Λ	120	NM			-				
_		/\				-no iron oxide staining.	_				
-		/\					-				
_		/ \									
_		/ \				-iron oxide staining preser	nt				
		/ \					_				
50		50.0					_				
_		\					=				
-		\ /					-				
_		\ /				SILTY SAND (SM) Dark yellowish brown mot	tled with tan				
_		\ /				medium dense, very fine t	o coarse				
_		\				grained, trace clay.	-				
55		V					_				
_	S6	Λ	120	NM			-				
_		/\				SAND (SP)					
-		/ \				Pale olive with iron oxide mottled with dark gray, loc	staining ose, medium				
		/ \				grained.	,				
-		/ \					=				
		/ ₀₀₀ \									
60		60.0				(soil description on next p	age)				
					::::::	, , , , , , , , , , , , , , , , , , , ,					



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI IR78GW90-MCH

Soil Boring Log

SHEET 3 OF 4

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.14 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286432.10, 3839650.20 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 8-in casing to 90-ft, 6-in to 110-ft

EAST, NORTH (UTM Z18 NAD8	-			DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 8-in casing to 90-ft,					
WATER LEVEL: 14.4 ft BTOC (9	9/16/2011)	STAR ¹			A.Guilfoyle/CLT				
GROUND SURFACE (ft) SAMPLE TYPE INTERVAL (ft)	RECOVERY (inches) PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up				
65_	120 NM		SAND (SW) Pale olive with trace iron oxide staining, medium dense, very fine to coarse grainedlight olive brown, coarse grained, no silt, shell fragments presentloose, moderately to weakly cemented sand pieces.						
75	120 NM] 	SILTY SAND (SM) Dark gray, medium dense, very fine to medium grained, little to trace gravelsized shell fragments.						
85	132 NM		SAND (SW) Gray, very fine to coarse grained, trace shell fragments. -increase gravel-sized shell fragments. SILTY SAND (SM) few shell fragments.	8-in temporary casing installed to 90 feet					
90.0			-	bgs					



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW90-MCH

SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.14 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286432.10, 3839650.20 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 8-in casing to 90-ft, 6-in to 110-ft

WATER LI	-			•		3839650.20 RT: 8/31/2011	DRILLING METHOD		8/31/2011	V C13GOOTIIC 1		ER : A.G		
			0/10/20				L DESCRIPTION	LIND.	0/31/2011	COMN		LIV. M.O	WE	
DEPTH BELOW GROUND SURFACE (ft)	l l	AL	£ €	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME	, USCS GROUP SYMB	OL,					DIAG	
1 BE 3 SU (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	CREEN (ppm)	일	MOISTUR	COLOR, E CONTENT, RELATIV	E	DE	EPTH OF CASI	NG, DRILLING	i	Surface Comple	e etion:
EP T	SAI	Ž	REC (ir	08.0	RA.	CONSISTE	DENSITY OR NCY, SOIL STRUCTUR		TE	ATE, DRILLING ESTS, & INSTR	UMENTATION		Stick u	p
DIG				₫	o o		MINERALOGY	KE,		,				
_		\ /				SILTY SAND few shell fragn	(SM)	_						X /2
-		\ /				lew shell flagil	iens.	-	1					
		\				0.4115 (0)40			1					
-		$ \setminus $				SAND (SW) Grav. verv mo	ist, trace cemented sar	nd -	ł					
95		$ \setminus / $				pieces within s		_	1					
-		$ \setminus / \mid$						-	ł					
	S10	I	138	NM			emented sand, gravel-	_	1					
_		/				sized.		-	-					
		/\						_	1					
-		$\mid \ / \ \setminus \mid$						-	ł					-
		$ \ /\ \ $						_	1					
100		V100.0 V				SII TY SAND	WITH CLAY (SM)		-				<u> </u>	
		IA AI				Light gray, we	t, plastic, some clay,		1					
_		/ 1\01.5/				abundant grav	el-sized pieces of high	ly _	-					\equiv
		V					~ .	_]					
_	S11	$ \ \ \ \ \ \ $	60	0		SAND (SP)		_	-					\exists
		$ \ /\ \setminus\ $				Gray, medium	dense to loose, fine to	_]					
105		105.0				medium graine pieces or shell	ed, no cemented sand fragments	-	ł					\exists
100_		105.0				No Recovery.			1					\exists
-								-	-					∄ -
								_	1					\exists
_	NS		NM	NM				_	-					∄ '⊹⊹
-	140		I VIVI	INIVI				_	1					\exists
-								-	ł				<u> </u>	
110_		110.0						_						
I ⊢						End of Boring	Log at 110' bgs	-	Boring dril	led to 110.0' b	gs to set well.			-
						Abbreviations:		_	1					
-						bgs - below gr	ound surface	-	-					-
						BTOC- below	top of casing	-	1					
-						ft - feet HA - Hand Au	ger	-	-					4
						in - inch NM - Not Mea		_	1					_
115_						NS - Not Sam	oled	_	ł					-
						PID - photo ion S - Sonic Run	nization detector	_						
-						o - donie ran		-	-					-
1 =								_	1					
-								_	ł					7
								_	1					_
120								-	-					7
120_									1					
-								-	-					4
								-						-



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI IR78GW91-LCH

Soil Boring Log

SHEET 1 OF 6

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.30 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 286435.06, 3839650.58										100-ft
WATER LEVEL: 14	.6 ft BTO	0 (9/16/20	11)	STA	RT: 8/24/2011	EN	ND: 8/24/2011	LOGGER	: A.Guilfoyle/C	LT
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME MOISTUF CONSISTE	IL DESCRIPTION E, USCS GROUP SYMBOL, COLOR, RE CONTENT, RELATIVE DENSITY OR NCY, SOIL STRUCTURE, MINERALOGY	I F	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, FESTS, & INSTRUMENTATION	WEI DIAGF Surface Comple Stick u	RAM e etion:
 HA-1 5	5.0	60	0		medium dense grained. -yellowish brown.	orown, slightly moist, e, very fine to fine wn mottled with pale	-			
- - - - - - - - - - - - - - - - - - -	10.0	37	0		SAND (SP)	(SM) edium grained, trace clay. vn, dry, loose to medium				
15	20.0	60	0		grained, trace SANDY SILT Light gray mot	(ML) tled with yellow, moist, in sand content with				
25	30.0	12	0		No Recovery.	vhite, wet, loose, no silt.				



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW91-LCH

SHEET 2 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.30 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286435.06, 3839650.58 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in/150-ft, 8-in/130-ft, 10-in/100-ft

EAST, NORTH (UTM Z18 NAD83, meters) : 28643 WATER LEVEL: 14.6 ft BTOC (9/16/2011)							ND EQUIPMENT: VersaSonic Rig; 6-in/150-ft, 8-in/130-ft, 10-in/100-ft END: 8/24/2011 LOGGER: A.Guilfoyle/CLT					
# H	LVLL. 14	.011.0100	5 (9/10/20	l			IL DESCRIPTION	END. 6/	24/2011	COMMENTS		ELL
-OW	l	ب	₹ ~	N	LOG	SOIL NAME	E. USCS GROUP SY	MBOL,				RAM
H BEI	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	MOISTUF	COLOR, RE CONTENT, RELA	ATIVE	DEPTH	OF CASING, DRILLING	Surfa	ce oletion:
THE DO	SAN	N N	REC (in	OS C	RAP		DENSITY OR		RATE, TESTS	DRILLING FLUID LOSS, , & INSTRUMENTATION	Stick	up
DEPTH BELOW GROUND SURFACE (ft)				PII	9		ENCY, SOIL STRUC MINERALOGY	TURE,				
_		30.0				SAND (SW)	ery fine to coarse	-				
-						grained, trace	silt.	- 1				
] =		\				-light gray.						
-		\						- 1				
		\						- 1				
35												
	S4		96	0				7				
-												
-		\						4				
_		\										
_		\						-				
1 -		\										
40		40.0 \ 40.0						-				
		\ 40.0 /										
-		\						- 4				
						-pale olive wit	h iron oxide stainin	g, very				
-						fine to mediu	m grained, trace sil	t				
		$ \setminus / \mid$										
45		V						- 4				
45	S5		120	0				一二				
-		/\				-no iron oxide	staining	-				
		$ \ / \ $				no non oxido	otaning.					
_		/ \						4				
						-iron oxide sta	aining present.					
-		/ \						-				
50		50.0										
-		50.0										
		\						1				
-						SILTY SAND	(SM)					
-						Dark yellowisl	h brown mottled wit	h tan,				
-		$ \setminus / \mid$				grained, trace	e, very fine to coars clay.	se -				
		\/						1				
55	S6	X	120	0				-				
		/\				CAND (CD)						
-		/ \				SAND (SP) Pale olive with	n iron oxide staining	, 1				
] -						mottled with d	lark gray, loose, me	dium				
-						granicu.		-				
] =		/ \						1				
60_		60.0										
-		60.0				(soil description	on on next page)					
				1		I					NΥΛ	$-V\lambda V$



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW91-LCH SHEET 3 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.30 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286435.06, 3839650.58 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in/150-ft, 8-in/130-ft, 10-in/100-ft

EAST, NORTH (UTM Z18 NAD83, meters) : 286435.06, 3839650.58						3839650.58	DRILLING METHOD AI	ND EQ	UIPMENT: VersaS	onic Rig; 6-in/150-ft, 8-in	/130-ft, 10-in/	100-ft
WATER LI	EVEL: 14	.6 ft BTO	C (9/16/20	11)	STA	RT: 8/24/2011		END: 8	/24/2011		: A.Guilfoyle/	CLT
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAMI MOISTUI CONSISTI	OIL DESCRIPTION E, USCS GROUP SYMBO COLOR, E CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE MINERALOGY		DEPTH OF RATE, DRI	COMMENTS CASING, DRILLING LLING FLUID LOSS, NSTRUMENTATION	WE DIAG Surfac Comp Stick t	RAM
65	S 7		120	1.1		medium dens grained, trace -light olive bro silt, shell frag	own, coarse grained, no iments present.	-				
70		70.0						\exists				
75	\$8	70.0	120	13.9		medium grain sized shell fra	edium dense, very fine to ed, little to trace gravel-					
85	00	80.0	132	30		shell fragmen	vel-sized shell fragments.	}				
90 <u> </u>		90.0				-shell fragmer	nts increasing with depth.	-				



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW91-LCH

SHEET 4 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 27.30 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286435.06, 3839650.58 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in/150-ft, 8-in/130-ft, 10-in/100-ft

EAST, NORTH (UTM Z18 NAD83, meters): 286435.06, 3839650.58 WATER LEVEL: 14.6 ft BTOC (9/16/2011) START: 8/24/20													
WATER L	EVEL: 14	1.6 ft BTO	0 (9/16/20	11)	STA	RT: 8/24/2011		END:	8/24/2011	LOGGER :			
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME MOISTUF CONSISTE	IL DESCRIPTION E, USCS GROUP SYMBO COLOR, RE CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE MINERALOGY		COMMEN DEPTH OF CASING, RATE, DRILLING FLI TESTS, & INSTRUME	DRILLING JID LOSS,	WE DIAG Surfac Comp Stick u	RAM ce letion:	
95	S10		138	61		pieces within	ments.	- - - - - - - -					
100		100.0				SANDY CLAY	Y (CL)	-	10-in temporary casing insta feet bgs	illed to 100			
105	S11	110.0	120	4.4		Light gray, we stiffness, med SILTY SAND medium dens amounts of greemented sar SAND (SP) Gray, well gray	et, soft to medium lium plasticity. WITH CLAY (SM) e, some clay, little avel-sized highly	e					
115	S12	120.0	114	6.2		fragments. SAND (SW)	ome gravel-sized shell						
- - -		120.0				abundant grav	vel-sized shell fragments	· -					



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI IR78GW91-LCH SHEET 5 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR : Miller Drilling of Nashville TN ELEVATION: 27.30 ft above sea level

EAST, NORTH (UTM Z18 NAD83, meters): 286435.06, 3839650.58 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in/150-ft, 8-in/130-ft, 120-ft, 12									
WATER LEVEL: 14.6 ft BTOC ((9/16/2011)	START:		D: 8/24/2011	LOGGER : A.				
GROUND SURFACE (ft) SAMPLE TYPE INTERVAL (ft)	RECOVERY (inches) PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CA: RATE, DRILLIN	MMENTS SING, DRILLING IG FLUID LOSS, RUMENTATION	WELL DIAGRAM Surface Completion: Stick up			
125_	111 8.6	m	SAND (SP) nedium grained, trace silt, trace shell ragments.						
135 S14 140.0	45 6.2		No Recovery.	S-in temporary casing bgs	installed to 130 feet				
145	102 3.4	m fra	secil description on post page)		has to cot well				
		(s	soil description on next page)	Boring drilled to 150.0'	bgs to set well.	- - -			



PROJECT NUMBER:	BORING NUMBER:					
423783.FI.WI	IR78GW91-I CH	SHEET	6	OF	6	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.30 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

									onic Rig; 6-in/150-ft, 8-in/1	
WATER L	EVEL: 14	I.6 ft BTO	C (9/16/20	1	STA	RT: 8/24/2011 SOIL DESCRIPTION SOIL DESCRIPTION		3/24/2011	LOGGER : A	A.Guilfoyle/CLT
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, USCS GROU COLOR, MOISTURE CONTENT, DENSITY OR CONSISTENCY, SOIL ST MINERALOGY	P SYMBOL, RELATIVE RUCTURE,	DEPTH OF RATE, DRI	CASING, DRILLING LLING FLUID LOSS, NSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
-						End of Boring Log at 150' bg	s _			-
-						Abbreviations:]			-
155 - - -	-					bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch	-1			
- - -						NM - Not Measured NS - Not Sampled PID - photo ionization detect S - Sonic Run	or -			- - - -
160_										_
-	-						-			-
-	-						1			-
-	-						1			-
-	-						1			-
165_										
-							-			-
-							-			-
-							-			-
-										-
170_										
-										-
-										-
							-			-
] -]						-			-
175_							\exists			_
]						-			-
]									-
]						-			-
]						-			-
180_]									
-]									-
-]									-
	1									_



25

30

28.0

28.0

EAST, NORTH (UTM Z18 NAD83, meters): 286363.96, 3839567.84

PROJECT NUMBER:	BORING NUMBER:				
423783.FI.WI	IR78GW92-MCH	SHEET	1	OF	3

Soil Boring Log

DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.72 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

WATER LEVEL: 15.6 ft BTOC (9/16/2011) START: 8/14/2011 END: 8/14/2011 LOGGER : B.Propst/CLT DEPTH BELOW 3ROUND SURFACE SOIL DESCRIPTION COMMENTS WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM INTERVAL (ft) RECOVERY (inches) SAMPLE TYPE COLOR, (mdd) GRAPHIC Surface Completion: DEPTH OF CASING, DRILLING ŧ MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION DENSITY OR Stick up CONSISTENCY, SOIL STRUCTURE, MINÉRALOGY SILT (ML)
Reddish brown with some gray, damp, 0.0 medium stiff. Lithology from 0-60' taken from IR78GW94-LCH SANDY SILT (SM) Tan to gray. 72 NM S1 8.0 -gray, stiff. 10 SAND (SP)
Tan to gray, wet, dense, grain size increasing with depth. S2 96 NM 15 18.0 18.0 20 -gray with orange layers of fine silty sand. S3 120 NM

> SILTY SAND (SM) Gray, 2mm clasts.

sand.

SAND (SP)
Gray with orange layers of fine silty



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW92-MCH

SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.72 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286363.96, 3839567.84 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing

EAST, NORTH (UTM Z18 NAD83, meters) : 286363.96, 38 WATER LEVEL: 15.6 ft BTOC (9/16/2011) STAR									D. D. D			
WATER L	EVEL: 15	5.6 ft BTO	C (9/16/20	11)	STA	RT: 8/14/2011		ND:	8/14/2011		R : B.Propst/C	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME MOISTUF CONSISTE	IL DESCRIPTION E, USCS GROUP SYMBOL COLOR, RE CONTENT, RELATIVE DENSITY OR NOY, SOIL STRUCTURE, MINERALOGY		RATE,	COMMENTS OF CASING, DRILLING DRILLING FLUID LOSS, & INSTRUMENTATION	DIA Surf	ELL GRAM ace apletion: up
35_	S4	38.0	96	NM		SAND (SP)	nge layers of fine silty	- - - - - - - -				
40		38.0				-gray, thin silt	stringers.	- - - - -				
45	S5	48.0	84	NM				- - - - - -				
50		48.0					vith some gray.	- - - - - - -				
55	S6	58.0	108	NM		-dark gray.	<u>(SM</u>)	- - - - -				
60	S7	58.0 60.0 60.0	24	NM		CAND (CD)		-				
_		BULU				SAND (SP) Light gray, ver	y dense.	-				



PROJECT NUMBER:	BORING NUMBER:					
423783.FI.WI	IR78GW92-MCH	SHEET	3	OF	3	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.72 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286363.96, 3839567.84 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing

	EAST, NORTH (UTM Z18 NAD83, meters) : 286363.9 NATER LEVEL: 15.6 ft BTOC (9/16/2011)							IND EQUIPMENT: VersaSonic Rig; 6-in casing END: 8/14/2011 LOGGER: B.Propst/CLT		· P. Dronot/CLT
H.	LVLL. 13	0.011.0100	5 (9/10/20			SOIL DESCRIP		0/14/2011	COMMENTS	WELL
DEPTH BELOW GROUND SURFACE (ff)		Ļ	≿ _	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, USCS GRO				DIAGRAM
H BEI	PLE PE	RVA ft)	OVE	ZEE pm)	阜	COLOR, MOISTURE CONTEN	RELATIVE	DEI	PTH OF CASING, DRILLING	Surface
HE ON	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	SCI (b	₹	DENSITY C	R	RA [*]	TE, DRILLING FLUID LOSS, STS, & INSTRUMENTATION	Completion: Stick up
DE SROI		_	Œ.	B	<u>5</u>	CONSISTENCY, SOIL MINERALO	STRUCTURE, SY		513, & INSTRUMENTATION	·
		\ /				SAND (SP)	-			
-		\				Light gray, very dense.	-	-		
-		\					-			
		$ \setminus $					-]		
-		$ \setminus $					-			
65		$ \ \ $]		
-	S8	X	120	0			-	ł		
		/\					-			
-		$ \ / \ $					-			
-		/ \					-	1		
_							-	-		
-		/ \					-	1		
70		70.0				F-1-1 D-4-1 701 b		Dania a daille	- d t- 70 01 b t t ll	
-						End of Boring Log at 70' b	gs _	Boring arille	ed to 70.0' bgs to set well.	-
						Abbreviations:	-	1		-
-						bgs - below ground surfac	е -	1		-
						BTOC- below top of casing ft - feet]]]
-						HA - Hand Auger	-	1		-
_						in - inch NM - Not Measured	-	1		
75						NS - Not Sampled		ł		
						PID - photo ionization dete S - Sonic Run	ector -			_
_						3 - Soriic IXuri	-			-
							-	•		_
_							_			-
-							-	1		-
							-	1		-
80										
							-]		_
-							-	ł		-
							-			_
-							-	-		=
							-	1		=
85							-	-		-
65								1		
1 -							-			=
-							-	1		-
1 -							-	1		1
-							-	1		=
							-	1		= =
90							-	ł		-
"-								1		_
-							-	-		=
	1									



PROJECT NUMBER:	BORING NUMBER:				
423783.FI.WI	IR78GW93-MCH	SHEET	1 OF	4	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.74 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTN	M Z18 NA	<u> D83, met</u>	ers): 286	364.05,	3839566.62	DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing to 110-ft, 8		
WATER LEVEL: 15.6	6 ft BTOC	(9/16/20	11)	STA			ND: LOGGER : K.Howell/CLT	
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, MOISTURE [CONSISTEN	DESCRIPTION USCS GROUP SYMBOL, COLOR, E CONTENT, RELATIVE DENSITY OR ICY, SOIL STRUCTURE, INNERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, Completion:	
5_ S1	8.0	72	0.5		SANDY SILT (S	with some gray, damp,	Lithology taken from IR78GW94-LCH	
10	8.0	96	5.2		-gray, stiff. SAND (SP) Tan to gray, we increasing with	t, dense, grain size depth.		
15	18.0							
20	18.0				-gray with oranç sand.	ge layers of fine silty		
25	28.0	120	0.2		SILTY SAND (S Gray, 2mm clas	<u>SM)</u>		
30_	28.0				SAND (SP)	e layers of fine silty		



PROJECT NUMBER:	BORING NUMBER:			
423783.FI.WI	IR78GW93-MCH	SHEET	2 OF	4

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.74 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286364.05, 3839566.62 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing to 110-ft, 8-in to 90-ft

	EAST, NORTH (UTM Z18 NAD83, meters) : 286364.05, 38395 WATER LEVEL: 15.6 ft BTOC (9/16/2011) START:								
WATER L	EVEL: 15	5.6 ft BTO	C (9/16/20	11)	STAI		END:	LOGGER : K	Howell/CLT
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP S COLOR, MOISTURE CONTENT, RE DENSITY OR CONSISTENCY, SOIL STRU MINERALOGY	LATIVE	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	Surface Completion:
35	S4	38.0	96	0		SAND (SP) Gray with orange layers of fine sand.			- - - - - - - - -
40		38.0				-gray, thin silt stringers.			- - - - - -
45 - - - - - - -	S5	48.0	84	0					- - - - - - -
50		48.0				-light orange with some gray.			- - - - - -
55 	S6	58.0	108	0		SANDY SILT (SM) -dark gray.			- - - - -
60		58.0				-gray, dense to very dense, occ shell fragments.	asional		- - -



PROJECT NUMBER: BORING NUMBER: IR78GW93-MCH 423783.FI.WI SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR: Miller Drilling of Nashville TN ELEVATION: 27.74 ft above sea level

EAST, NORTH (UTI	<u> </u>	.D83, met	ers): 286	<u>364.05, 3</u>	3839566.62 DRILLING METHOD AN	D EC	QUIPMENT: VersaSonic Rig; 6-in casing to 110-ft, 8-in to 90-ft
WATER LEVEL: 15.6	6 ft BTOC	(9/16/20		STA		ND:	LOGGER : K.Howell/CLT
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION Completion:
65	68.0	96	0		-dark gray.		
70	78.0	108	0				
80 80 85	78.0	120	0				
	88.0				-gray, dense to very dense, partially cemented fossilferous limestone.		8-in temporary casing installed to 90 feet bgs



PROJECT NUMBER:	BORING NUMBER:					
423783.FI.WI	IR78GW93-MCH	SHEET	4	OF	4	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.74 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286364.05, 3839566.62 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing to 110-ft, 8-in to 90-ft

WATER LI					STA		ND:	NUIPMENT: VersaSonic Rig; 6-in casing to 110-ft, 8-in to 90-ft LOGGER: K.Howell/CLT			
_ 8						SOIL DESCRIPTION	<u></u>	COMMENTS			
DEPTH BELOW GROUND SURFACE (ft)		AL	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, USCS GROUP SYMBOL,	.				
H BE O SU (#)	SAMPLE TYPE	INTERVAL (ft)	OVE	CREEN (ppm)	JHC	COLOR, MOISTURE CONTENT, RELATIVE			face npletion:		
EP T	SAI	Ž	REC (ir) DS	3RAF	DENSITY OR CONSISTENCY, SOIL STRUCTURE,		RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	ripietion.		
DI GRC				┧	U	MINERALOGY					
_						-gray, dense to very dense, partially cemented fossilferous limestone.	-		-		
		\				cemented rossilierous limestorie.			-		
_	S10	\	12	0			4		_		
-		\					┪		-		
95		\					4				
-		\					-		-		
		\					4		-		
-		\					- 1		-		
		98.0 \					4		-		
-		98.0					- 1		-		
100							4		-		
100		\					\dashv				
		\					7		_		
-		\					Ⅎ		-		
		\					1		-		
-	S11		108	0			4		-		
							1		_		
105		\					\dashv		-		
_		\					コ				
-		\					\dashv		-		
		\					1		_		
-		108.0					\exists		-		
_		108.0				-gray, dense to very dense, some shell	1		-		
-	S12	$\mid \times \mid$	24	0		fragments.	\dashv		-		
110_		110.0							_		
-						End of Boring Log at 110' bgs	4		-		
						Abbreviations:			-		
-						bgs - below ground surface	\dashv		-		
						BTOC- below top of casing			-		
-						ft - feet HA - Hand Auger	\dashv		-		
 						in - inch NM - Not Measured			-		
115_						NS - Not Sampled	\dashv				
						PID - photo ionization detector S - Sonic Run	1		-		
-						C Como rum			-		
									-		
-							4		-		
							1		-		
120							4		_		
120_							亅				
-							4		_		
_							-		-		



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI IR78GW94-LCH SHEET 1 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR : Miller Drilling of Nashville TN ELEVATION: 27.65 ft above sea level

SOIL DESCRIPTION COMMENTS COMM	EAST, NORTH (UTM Z18	NAD83, me	ters): 286	365.43,	3839567.26	DRILLING METHOD AN	ND EQI	UIPMENT: VersaSonic Rig; 6-in casing to 1	50-ft, 8-in to 130	<u> </u>
S1	WATER LEVEL: 15.6 ft B	OC (9/16/20	011)	STA	RT: 8/9/2011	E	END: 8	/9/2011 LOGGER :	K.Howell/CLT	
S1	GROUND SURFACE (ft) SAMPLE TYPE INTERVAL (#)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAMI MOISTUI CONSISTI	E, USCS GROUP SYMBOI COLOR, RE CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS,	DIAGRA Surface Completio	AM
SAND (SP) Tan to gray, wet, dense, grain size increasing with depth. 15 18.0 18.0 18.0 20 21 22 28.0 28.0 28.0 30 30 30 30 30 30 30 30 30	5 S1	72	0.5		Reddish brow medium stiff. SANDY SILT					
gray with orange layers of fine silty sand. S3	10	96	5.2		SAND (SP) Tan to gray, v	vet, dense, grain size th depth.				
30_ sand.	20		0.2		SILTY SAND Gray, 2mm cl	<u>(SM)</u> asts.				



PROJECT NUMBER:	BORING NUMBER:				
423783.FI.WI	IR78GW94-LCH	SHEET	2	OF	6

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.65 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286365.43, 3839567.26 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

	AST, NORTH (UTM Z18 NAD83, meters) : 286365.43, 383 ATER LEVEL: 15.6 ft BTOC (9/16/2011) START											
WATER L	EVEL: 15	5.6 ft BTO	C (9/16/20	11)	STA	RT: 8/9/2011					: K.Howell/C	
A CE				9	ڻ		L DESCRIPTION			COMMENTS	WI	ELL
임품	щ	\AL	ER)	EN C	9	SOIL NAME	, USCS GROUP SYMBOI COLOR.	-,				SRAM
E D S(#)	SAMPLE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	MOISTUR	COLOR, E CONTENT, RELATIVE		DEP1	TH OF CASING, DRILLING E, DRILLING FLUID LOSS,	Surfa Com	ce oletion: up
EPT	S ⊢	트	REC (ir	080	X		DENSITY OR		TEST	S, & INSTRUMENTATION	Stick	up
DEPTH BELOW GROUND SURFACE (ff)				Б		CONSISTE	NCY, SOIL STRUCTURE MINERALOGY	,				
		\				SAND (SP)		_				
_		\				sand.	ge layers of fine silty	-	-			
-		\				, ourid.		-	1			
		\		_				_]			
-	S4	\	96	0				_				
-		\						-	1			
35		\						_]			
_		\						_				
-		\						-	1			
-		\						_]			
-		,, , \						-				
-		38.0 \ 38.0				gray, thin silt :	stringers	-	-			
		\				9.47,	5go.o.	_]			
40 -		\						-				<i>\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\</i>
40		\							1			
		\						_	1			
_		\						-				
_		\						-	-			
		\						_	1			
_	S5	\	84	0				_				
-		\						-	1			
45		\						_	1			X/A
-		\						-	-			
_		\						-	1			
		\						_	1			
_		48.0						-	-			
_		48.0						-	1			
_		\						_				
50		\						_	-			<i>Y//</i>
		\				-light orange w	rith some gray.	_]			
_		\						-				<i>\(\)</i>
_		\						-	-			
		\						_	1			
1 -	S6	\	108	0	 	SANDY SILT	'SM\		-			
1 -	30	\	100				<u> </u>	-	1			
		\						_]			
55		\						_	-			
-		\						-	1			
1 -		\				-dark gray.		_]			
1 -		\						-	-			
1 -		58.0						-	1			
1 -		√58.0						_]			
1 -		\						-	-			
60		\						-	1			
1 -		\				-gray, dense to	very dense, occasional	_]			
L		<u> </u>				shell fragmen	IS.		<u> </u>		()	\sim



PROJECT NUMBER:	BORING NUMBER:				
423783.FI.WI	IR78GW94-LCH	SHEET	3	OF	6

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.65 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286365.43, 3839567.26 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

	AST, NORTH (UTM Z18 NAD83, meters) : 286365.43, 3839567.26 (ATER LEVEL: 15.6 ft BTOC (9/16/2011) START: 8/9/2011						DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in cas						
WATER LEV	/EL: 15	.6 ft BTO	0 (9/16/20	11)	STA	RT: 8/9/2011		END: 8/9		LOGGER : K.Howell/CLT			
GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAM MOISTU CONSIST	DIL DESCRIPTION IE, USCS GROUP SYN COLOR, IRE CONTENT, RELAT DENSITY OR IENCY, SOIL STRUCTI MINERALOGY	IVE	COMMENT DEPTH OF CASING, RATE, DRILLING FLU TESTS, & INSTRUME	DRILLING JID LOSS,	WELL DIAGRA Surface Completio Stick up	M/	
-	S7	68.0	96	0		-dark gray.		-					
70	S8	78.0	108	0									
80	S 9	78.0	120	0									
90		88.0				-gray, dense cemented fo	to very dense, partiall ssilferous limestone.	y					



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW94-LCH

SHEET 4 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.65 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286365.43, 3839567.26 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

EAST, NO	DRTH (U	TM Z18 N	AD83, met	ters): 286	<u>365.43, 3</u>	839567.26 DRILLING METHOD AN	DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing to 150-ft, 8			-ft	
WATER L	EVEL: 15	6.6 ft BTO	C (9/16/20	11)	STAI		ND: 8/9/2011		LOGGER : K.Howell/CLT		
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY SOIL NAME, USCS GROUP SYMBOL, COLOR, DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION		RATE, DRILLING FLUID LOSS,	WELL DIAGRA Surface Completior Stick up	.M	
95	S10	98.0	12	0		-gray, dense to very dense, partially cemented fossilferous limestone.					
100 <u></u>		98.0					-				
105	S11	108.0	108	0							
110	S12	108.0	108	0		-gray, dense to very dense, some shell fragments.					
115 - 	312	118.0 \118.0	100	Ü		dark grow to grow with alive your	- - - - - - - - - -				
120		118.0				-dark gray to gray with olive, very dense, trace silt, some fossil fragments.	- - - - - -				



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI IR78GW94-LCH SHEET 5 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR: Miller Drilling of Nashville TN ELEVATION: 27.65 ft above sea level

EAST, NORT				•				UIPMENT: VersaSonic Rig; 6-in casing to 150		
WATER LEVE	EL: 15.	.6 ft BTOC	(9/16/20		STA	RT: 8/9/2011 EN SOIL DESCRIPTION	ND: 8	3/9/2011 LOGGER : K COMMENTS		
GROUND SURFACE (#)	TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRA Surface Completic Stick up	AM
125 - - -	613	128.0	96	0		-gray, dense to very dense, some shell fragments. -gray, abundant fossils. -dark gray to gray with olive, trace fossils.				
130		128.0						8-in temporary casing installed to 130 feet bgs		
135	614	138.0	108	0		SILTY SAND (SM) Light gray to dark gray.				
140		138.0				SAND (SP) Olive gray, trace to some silt.				
145	S15	150.5	108	0						
150		150.0				(soil description on next page)	- - -	Boring drilled to 150.0' bgs to set well.		<u> 13 - 55 </u> - - - -



PROJECT NUMBER:	BORING NUMBER:					
423783.FI.WI	IR78GW94-LCH	SHEET	6	OF	6	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.65 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NO	ORTH (U	ΓΜ Z18 N	AD83, me	ters) : 286	<u>365.43, 3</u>	3839567.26	DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130				
WATER L	START: 8/9/2						END: 8	/9/2011	LOGGER : F	K.Howell/CLT	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAM MOISTU CONSIST	DIL DESCRIPTION E, USCS GROUP S' COLOR, COLOR, DENSITY OR ENCY, SOIL STRUC MINERALOGY	ATIVE	COMME DEPTH OF CASIN RATE, DRILLING I TESTS, & INSTRU	G, DRILLING FLUID LOSS,	WELL DIAGRAM Surface Completion: Stick up
155 <u></u> - 155 <u></u> - -						Abbreviations bgs - below g BTOC- below ft - feet HA - Hand Ai in - inch NM - Not Mei	ground surface or top of casing uger asured				- - - - - - - -
160						NS - Not San PID - photo id S - Sonic Rui	onization detector				- - - - - - -
165 - - - - -								1			- - - - - - -
170 <u></u> - 170 <u></u> - - - -								- - - - -			- - - - - - - - -
175 <u></u> - 175 <u></u> - - -											- - - - - - - - -
180 - - - - - - - -								-			- - - - - - -



PROJECT NUMBER:	BORING NUMBER:					
423783.FI.WI	IR78GW95-MCH	SHEET	1	OF	3	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.19 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters); 286533.37, 3839813.31 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing

EAST, NO	RTH (U	TM Z18 N	AD83, me	ters) : 286	533.37, 3	3839813.31	DRILLING METHOD AI	ND EC	QUIPMENT: VersaSonic Rig;	6-in casing		
WATER LE	VEL: 16	6.15 ft BTC	OC (9/16/2	011)	STA	RT: 8/22/2011		END:	8/22/2011		A.Guilfoyle/	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME MOISTUR CONSISTE	IL DESCRIPTION E, USCS GROUP SYMBO COLOR, RE CONTENT, RELATIVE DENSITY OR NOY, SOIL STRUCTURE MINERALOGY		COMMEI DEPTH OF CASING RATE, DRILLING FI TESTS, & INSTRUM	G, DRILLING LUID LOSS,	WE DIAG Surfac Comp Stick t	RAM
5	S 1	8.0	72	NM		SILTY SAND Tan. SAND (SP) Gray to tan, tra	ace silt.		Lithology from 0-60' taken t IR78GW97-LCH	from		
10		8.0				-gray with orar	nge, saturated, dense.					
15	S2	18.0	72	NM								
20		18.0				Gray, stiff. -gray with oran						
25	S 3		228	NM		SAND (SP) Gray with oran	nge and tan, dense.					
30		\						_				



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW95-MCH
SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.19 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286533.37, 3839813.31 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing

WATER L							: 8/22/2011	LOGGER :	A.Guilfoyle/CLT
H.			9/10/2			SOIL DESCRIPTION	. 6/22/2011	COMMENTS	WELL
DEPTH BELOW GROUND SURFACE (ff)		ب ا	≿ -	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME. USCS GROUP SYMBOL.			DIAGRAM
SUF	SAMPLE	INTERVAL (ft)	RECOVERY (inches)	SCREEN (ppm)	12	COLOR, MOISTURE CONTENT, RELATIVE	1	DEPTH OF CASING, DRILLING	Surface
F B #	May 1	E E	ECO (ind	SCF.	APH A	DENSITY OR		RATE, DRILLING FLUID LOSS,	Completion: Stick up
	0)	_ =	₩.	G.	R.	CONSISTENCY, SOIL STRUCTURE,		TESTS, & INSTRUMENTATION	Stick up
<u> 5</u>		Ι.			12 12 14 1	MINÉRALOGY SAND (SP)	+		<u> </u>
		\				Gray with orange and tan, dense.	1		
_		\]		
-		\					4		
-		\					1		
		\]		
35		\					4		
33_		\				_	1		
		\]		
-		\					4		
-		\				-dark gray.	1		
		38.0				3.7	1		
-		38.0					4		
-		N /					1		
40		I\				_	1		
-		\					4		
_							1		
]		
-							-		
-		$ \ \ $					1		
_		$ \ \ $				gray with orange	4		
45		$ \ \ $				-gray with orange.	-		
-		\				_	1		
_		\					4		
-		l \/					1		
_		l V				SANDY SILT (SM)	7		
-	S4		240	NM		weakly cemented, abundant fossils.	-		
	0 7	I /	240	14101			1		
		I /\]		
50						_	-		
							1		
-							4		
-							1		
							1		
-							4		
-							1		
55		I/ \				_	4		
-							4		
_		II \					1		
1 -		/ \				-partially cemented clasts.	4		
1 -		58.0					1		
1 -		58.0				SAND (SP)	7		
-	S5	$\mid \times \mid$	24	0		trace silt, trace fossil fragments.	-		
60	- 55	60.0					1		
-		60.0				No Recovery.	4		
		_		1		l .			



PROJECT NUMBER:	BORING NUMBER:		
423783.FI.WI	IR78GW95-MCH	SHEET	3 OF 3

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.19 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing EAST, NORTH (UTM Z18 NAD83, meters): 286533.37, 3839813.31 WATER LEVEL: 16.15 ft BTOC (9/16/2011) START: 8/22/2011 END: 8/22/2011 LOGGER: A.Guilfoyle/CLT DEPTH BELOW GROUND SURFACE (ft) SOIL DESCRIPTION COMMENTS WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM INTERVAL (ft) (inches) SAMPLE TYPE COLOR, (mdd) GRAPHIC Surface Completion: DEPTH OF CASING, DRILLING MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, DENSITY OR Stick up TESTS, & INSTRUMENTATION CONSISTENCY, SOIL STRUCTURE, MINÉRALOGY No Recovery. SAND (SP)
Dark gray, wet, loose, medium grained, trace silt. 65 90 S6 -light gray. 70.0 70 End of Boring Log at 70' bgs Abbreviations: Boring drilled to 71.0' bgs to set well. bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured 75 NS - Not Sampled PID - photo ionization detector S - Sonic Run 80 85 90



PROJECT NUMBER:	BORING NUMBER:			
423783.FI.WI	IR78GW96-MCH	SHEET	1 OF	4

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.40 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286530.14, 3839814.04 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing to 110-ft, 8-in to 90-ft

WATER LI					STA		EQUIPMENT: VersaSonic Rig; 6-in casing to 110-tt, 8-in to 90-tt D: LOGGER: K.Howell/CLT
. 8			0,10,2	l		SOIL DESCRIPTION	COMMENTS
DEPTH BELOW GROUND SURFACE (ft)			₹ .	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME. USCS GROUP SYMBOL.	
H BEL	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	CREEN (ppm)	HC.	COLOR, MOISTURE CONTENT, RELATIVE	DEPTH OF CASING, DRILLING Surface
HTH.	SAN	N E	(in	SC (F	RAP	DENSITY OR	RATE, DRILLING FLUID LOSS, Completion: TESTS, & INSTRUMENTATION
DE 3RO				붑	Ū	CONSISTENCY, SOIL STRUCTURE, MINERALOGY	TEGTO, & INCITIONIENTATION
		0.0				SILT (ML)	
_		\				Dark brown with organics, damp, loose. SILTY SAND (SM)	-
		\				Tan.	1
_		\					1
_		\					4
		\					<u> </u>
5 -	S1	\	72	0.3		SAND (SP) Gray to tan, trace silt.	Lithology taken from IR78GW97-LCH
		\					_
_		\					4
-		\					1
]
-		8.0 \ \ 8.0				gray with orange, saturated, dense.	-
		\ \				3 : ,]
10							4
10		\				-	_
_		\					-
_		\					-
		\]
-	S2	\	72	0.1			4
	02	\	12	0.1			1
15		\					4
15		\				_	-
		\					1
-		\					-
		\]
_		18.0 \ \ 18.0			hiiiiii	SANDY SILT (SM)	-
		\ 10.0				Gray, stiff.	1
20 -							4
20		\				-gray with orange.	1
		\					1
-							-
							1
-		\				SAND (SP)	-
1]		\				Gray with orange and tan, dense.	1
25_		\					4
25_		\				-	1
		\					4
-		\					1
1]		\					1
-	S3	\	228	0			1
		\					1
30		\					-
						_	1



PROJECT NUMBER:	BORING NUMBER:					
423783.FI.WI	IR78GW96-MCH	SHEET	2	OF	4	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.40 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

FAST_NORTH (UTM 718 NAD83 meters) : 286530 14 3839814 04 DRILLING METHOD AND EQUIPMENT : VersaSonic Rig: 6-in casing to 110-ft. 8-in to 90-ft

EAST, NORTH (OD AND EQUIP	MENT: VersaSonic Rig; 6-in casing to 110	
WATER LEVEL:	16.17 ft BT0	OC (9/16/2		STA		END:	LOGGER : K	Howell/CLT
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SY COLOR, MOISTURE CONTENT, RELA DENSITY OR CONSISTENCY, SOIL STRUC' MINERALOGY	TIVE	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	Surface Completion:
35	38.0				SAND (SP) Gray with orange and tan, dense. -dark gray.			-
40	36.0					- - - - - - - - - - - - - - - - - - -		- - - - - - - - - -
45		240	0		-gray with orange. SANDY SILT (SM) weakly cemented, abundant fossi	- - - - - - - - - - -		- - - - - - - -
50	58.0	240	U		-partially cemented clasts.			- - - - - - - - - - - - - - - - - - -
60	58.0				SAND (SP) trace silt, trace fossil fragments.	- - - -		- - -



PROJECT NUMBER:	BORING NUMBER:					
423783.FI.WI	IR78GW96-MCH	SHEET	3	OF	4	

PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC CLIENT: NAVFAC

ELEVATION: 28.40 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

WATER LEVEL: 16.17 B BTOC (0/16/2011) START: SOIL DESCRIPTION COMMENTS SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITION CONSISTENT, RELATIVE CONSISTEN	EAST, NORTH (UTM	1 Z18 NA[D83, met	ers): 286	530.14, 3	3839814.04 DRILLING METHOD AND	D EQUIPMENT: VersaSonic Rig; 6-in casing to 110-ft, 8-in to 90-ft
Silty Sand (SM) Silty Sand (SM) Sand (SP) Trace sit.	WATER LEVEL: 16.17	7 ft BTOC	0 (9/16/2		STA		
Silty Sand (SM) Silty Sand (SM) Sand (SP) Trace sit.	DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE.	DEPTH OF CASING, DRILLING Surface RATE. DRILLING FLUID LOSS. Completion:
90	65			0		SILTY SAND (SM) Gray, weakly cemented. SAND (SP) trace silt. SILTY SAND (SM)	8-in temporary casing installed to 90 feet



1	PROJECT NUMBER:	BORING NUMBER:					
	423783.FI.WI	IR78GW96-MCH	SHEET	4	OF	4	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.40 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286530.14, 3839814.04 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing to 110-ft, 8-in to 90-ft

	-			-				PMENT: VersaSonic Rig; 6-in casing to 110	
WATER L	EVEL: 16	6.17 ft BTC	OC (9/16/2	011)	STA		END:	LOGGER : K	Howell/CLT
ACE			_	S N	90	SOIL DESCRIPTI SOIL NAME, USCS GRO		COMMENTS	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	COLOR, MOISTURE CONTENT, DENSITY OF CONSISTENCY, SOIL S' MINERALOG'	RELATIVE R TRUCTURE.	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	Surface Completion:
_		\ /				SILTY SAND (SM)	-		_
95 - - - - -		98.0				-partially cemented, abunda	ant fossils.		- - - - - - - - - - - - - - - - - - -
100 -							- - - - - - - - - - - - - - - - - - -		- - - - - - - -
105	S7		144	0		-trace fossils.			-
110_		110.0				End of Poring Log at 110' b			_]
115						End of Boring Log at 110' by Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detect S - Sonic Run			- - - - - - - - - - - - - - - - - - -
120 <u> </u>							- - - - - - - - - -		- - - - -



PROJECT NUMBER:	BORING NUMBER:					
423783.FI.WI	IR78GW97-I CH	SHEET	1	OF	6	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.33 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NOR	-			-					IT: VersaSonic Rig; 6		
WATER LEV	/EL: 16	.25 ft BTC	OC (9/16/2	l	STA	RT: 8/14/2011	EI SCRIPTION	ND: 8/14/2011	1 COMMEN		K.Howell/CLT
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, USC CC MOISTURE CO DEN CONSISTENCY, MINE	SCRIPTION CS GROUP SYMBOL, DLOR, INTENT, RELATIVE SITY OR , SOIL STRUCTURE, RALOGY		DEPTH OF CASING, RATE, DRILLING FLI TESTS, & INSTRUME	DRILLING UID LOSS,	WELL DIAGRAM Surface Completion: Stick up
- - - - - -	S1	8.0	72	0.3		SILTY SAND (SM) Tan. SAND (SP) Gray to tan, trace si					
10		8.0				-gray with orange, s	aturated, dense.				- - - -
15 - - - - - -	S2	18.0	72	0.1							- - - - - - - - -
20		18.0				Gray, stiff. -gray with orange.					- - - - - - - -
25	S3		228	0		SAND (SP) Gray with orange an	nd tan, dense.				- - - - - - - -
30								-			-



PROJECT NUMBER:	BORING NUMBER:			
423783.FI.WI	IR78GW97-I CH	SHEET	2 OF	6

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.33 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286531.94, 3839813.62 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 16.25 ft BTOC (prios2011) START 841/2011 SOIL DESCRIPTION COMMENTS WELL DIAGR OF SOIL NAME, USCS GROUP SYMBOL, COLOR TREATURE COLOR TREATURE CONSISTENCY SOIL STRUCTURE, MINERALOGY SAND (SP) Gray with orange and tan, dense. SAND (SP) Gray with orange.							8839813.62	DRILLING METHOD AN			voroacomo rag, c		
SANDY SILT (SM) weakly cemented, abundant fossils.	WATER L	EVEL: 16	5.25 ft BTC	C (9/16/2	011)	STA			ND: 8	8/14/2011			
SANDY SILT (SM) weakly cemented, abundant fossils.	W ACE				NG	ن ا					COMMEN ⁻	TS	WELL
SANDY SILT (SM) weakly cemented, abundant fossils.	JRF	щ	AL AL	s)	EN C	9	SOIL NAME	, USCS GROUP SYMBOL	,				
SANDY SILT (SM) weakly cemented, abundant fossils.	H BE	MPL	(£)	o de	KE ppm	₩	MOISTUR	E CONTENT, RELATIVE		DI	EPTH OF CASING,	DRILLING	Surface
SANDY SILT (SM) weakly cemented, abundant fossils.	E JN	SAI	Z	ZEC (jr) 80	🖔		DENSITY OR		l K	STS & INSTRUME	JID LOSS, ENTATION	Stick up
SANDY SILT (SM) weakly cemented, abundant fossils.	DE SRO				JI4	٥	CONSISTE	NCY, SOIL STRUCTURE, MINERALOGY			2010, 4 11101110111		
38.0 -dark gray. -dark gray. -dark gray. -gray with orange.	0		\			7, 47, 74, 7	SAND (SP)			8-in temp	orary casing install	ed to 30 feet	
-dark gray. -dark gray. -dark gray. -gray with orange.			\				Gray with orar	ge and tan, dense.	1		, ,		
-dark gray. -dark gray. -dark gray. -gray with orange.	_		\						-				
-dark gray. -dark gray. -dark gray. -gray with orange.	_		\						-	1			
-dark gray. -dark gray. -dark gray. -gray with orange.	_		\						-	1			
-dark gray. -dark gray. -dark gray. -gray with orange.	_		\						7	1			
-dark gray. -dark gray. -dark gray. -gray with orange.			\]				
38.0 38.0 38.0 -gray with orange. SANDY SILT (SM) weakly cemented, abundant fossils.	35		\						_				-
38.0 38.0 38.0 -gray with orange. SANDY SILT (SM) weakly cemented, abundant fossils.	_		\						-	1			
38.0 38.0 38.0 -gray with orange. SANDY SILT (SM) weakly cemented, abundant fossils.	_		\						7	1			
38.0 38.0 38.0 -gray with orange. SANDY SILT (SM) weakly cemented, abundant fossils.			\						4				
40	_		aa a \				-dark gray.		4				
45	-								-	1			
-gray with orange. SANDY SILT (SM) weakly cemented, abundant fossils.	_		\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \						1	1			
-gray with orange. SANDY SILT (SM) weakly cemented, abundant fossils.			\ //]	1			
S4 240 0 SANDY SILT (SM) weakly cemented, abundant fossils.	40		\ /										-
S4 240 0 SANDY SILT (SM) weakly cemented, abundant fossils.	-		\ /						-	1			
S4 240 0 SANDY SILT (SM) weakly cemented, abundant fossils.	_		\ /						1	1			
SANDY SILT (SM) weakly cemented, abundant fossils.			1 / 1						1	1			
SANDY SILT (SM) weakly cemented, abundant fossils.	_		\						-				
SANDY SILT (SM) weakly cemented, abundant fossils.	_		\						-	1			
SANDY SILT (SM) weakly cemented, abundant fossils.			\							1			
S4 240 0 SANDY SILT (SM) weakly cemented, abundant fossils.	1		\				-gray with orar	ge.	4				
S4 240 0 weakly cemented, abundant fossils.	45		\						-	1			-
S4 240 0 weakly cemented, abundant fossils.	_		\						-	1			
S4 240 0 weakly cemented, abundant fossils.			$\Lambda I = \Lambda$						1				
S4 240 0 weakly cemented, abundant fossils.	_		\mathcal{M}			1111111	CANDY CILT	CM)					
50	_		V				weakly cemen	ed abundant fossils	4	1			
	_	S4	1	240	0		wearry comen	ou, abandant roomo.	- 1	1			
			A 1						1	1			
									4				
55_	50		// /						\dashv	1			-
55_	1 -												
55_	1 -]				
55	-								-				
55	-								+				
55									1	1			
55] -								4				
	55 -								-	1			
	"-								\dashv	1			-
	1 -								j	1			
] -		/ \						4				
_	-		\				-nartially ceme	nted clasts	+				
【	-		58.0						-				
58.0 SAND (SP) trace silt, trace fossil fragments.							SAND (SP)			1			
trace silt, trace fossil fragments.] -		\ /				trace silt, trace	fossil fragments.	4	1			
	60 -		X						-				
"T / \	00		/\						-	1			-
	1 -		/ \			L			_	1			



PROJECT NUMBER:	BORING NUMBER:		
423783.FLWI	IR78GW97-I CH	SHEET	3 OF 6

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.33 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NO	ORTH (U	TM Z18 N	AD83, met	ters) : 286	531.94, 3	3839813.62 DRILLING METHOD AND EG	QUIPMENT: VersaSonic Rig; 6-in casing to 150	0-ft, 8-in to 130-ft
WATER L	EVEL: 16	6.25 ft BTC	OC (9/16/2		STA			K.Howell/CLT
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
70	S5	78.0 78.0	240	0		SILTY SAND (SM) Gray, weakly cemented. SAND (SP) trace silt. SILTY SAND (SM) weakly cemented to dense, increasing fossils.		



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI IR78GW97-LCH SHEET 4 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR: Miller Drilling of Nashville TN ELEVATION: 28.33 ft above sea level

				•		3839813.62	DRILLING METHOD AND EC			
WATER L	EVEL: 16	6.25 ft BTC	OC (9/16/2		STA	RT: 8/14/2011	L DESCRIPTION	8/14/2011 COMN	LOGGER : F MENTS	K.Howell/CLT
DEPTH BELOW GROUND SURFACE (ff)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME	E, USCS GROUP SYMBOL, COLOR, EE CONTENT, RELATIVE DENSITY OR	DEPTH OF CASI RATE, DRILLING	NG, DRILLING S FLUID LOSS,	WELL DIAGRAM Surface Completion: Stick up
DE		_	Œ	PID	GF		NCY, SOIL STRUCTURE, MINERALOGY	TESTS, & INSTR	OMENTATION	
_		\ /				SILTY SAND	<u>(SM</u>)			-
95						-partially ceme	ented, abundant fossils.			- - - - - -
100		98.0					- - - - - - - - -			- - - - - -
105						-trace fossils.	- - - - - - - - - - - - - - - - - - -			- - - - - -
110	S7		240	0		SAND (SP) Gray, saturate	d, dense			-
115							- - - - - - - - -			_
120 - - - 120 - - -		118.0				-very dense, ti	ace silt			



PROJECT NUMBER:	BORING NUMBER:					
423783.FI.WI	IR78GW97-LCH	SHEET	5	OF	6	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR : Miller Drilling of Nashville TN ELEVATION: 28.33 ft above sea level

EAST, NORTH (UTM Z18 NAD83, me	ters): 286531.94,	3839813.62	DRILLING METHOD	AND EC	QUIPMENT: VersaSonic Rig; 6-in casing to	150-ft, 8-in to 130-ft
WATER LEVEL: 16.25 ft BTOC (9/16/2	011) STA	RT: 8/14/2011		END:		: K.Howell/CLT
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE INTERVAL (ft) (ft) (inches)	PID SCREENING (ppm) GRAPHIC LOG	SOIL NAME MOISTUR CONSISTE	L DESCRIPTION , USCS GROUP SYMB COLOR, E CONTENT, RELATIV DENSITY OR NCY, SOIL STRUCTUF MINERALOGY	E	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
125	0	SILTY SAND (Gray, trace fos Gray, trace fos Gray, saturate	(SM) esils.			
S10 0 150.0	0			-		- - -
-		(soil descriptio	n on next page)	- - -	Boring drilled to 150.0' bgs to set well.	- - -



PROJECT NUMBER:	BORING NUMBER:					
423783.FI.WI	IR78GW97-LCH	SHEET	6	OF	6	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.33 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286531.94, 3839813.62 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

WATER LEVEL: 16.25 ft BTOC (9/16/2011) START: 8/14/2011 END: 8/14/2011 LOGGER SOIL DESCRIPTION COMMENTS COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR COLOR, MINERALOGY End of Boring Log at 150' bgs Abbreviations: bgs - below ground surface BTOC - below top of casing ft - feet HA - Hand Auger in - inch NM - Not Sampled NS - Not Sampled PID - photo ionization detector S - Sonic Run 165 165 165 165 165 165 165 16	50-ft, 8-in to 130-ft
Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	: K.Howell/CLT
Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	WELL DIAGRAM Surface
Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	Completion: Stick up
bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	-
BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	- -
in - inch NM - Not Measured NS - Not Sampled PID - photo ionization detector S - Sonic Run	-
NS - Not Sampled PID - photo ionization detector S - Sonic Run	-
160	-
	-
165	
165	-
165	-
	_
	- -
1 - 1	-
	- -
170_	- -
	-
	-
	- - -
	-
	- - -
180_	- -
	- -
	- -



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW98-MCH
SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.77 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286646.40, 3839644.31 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing

WATER LEVEL						DT. 7/00/0044	_ L	ID. 7	7/00/0044	LOCCED	· A Cuilfoula	CLT
ų l		1	ı		STAI	RT: 7/26/2011	ESCRIPTION	10: 7	7/26/2011	COMMENTS	: A.Guilfoyle	
DEPTH BELOW GROUND SURFACE (ft) SAMPLE			≿	PID SCREENING (ppm)	90		CS GROUP SYMBOL,			COMMENTS		ELL GRAM
PTH BELC UND SUR! (ft) SAMPLE	ш	INTERVAL (ft)	RECOVERY (inches)	CREEN (ppm)	GRAPHIC LOG	Ć	OLOR,		DEPTH	OF CASING, DRILLING	Surfa	
ND 8	፟	Ħ E	(ind	SCR (pp	APH		ONTENT, RELATIVE NSITY OR		RATE.	DRILLING FLUID LOSS.	Com	pletion:
S Sou		=	~	PID	GR	CONSISTENCY	, SOIL STRUCTURE,		TESTS	, & INSTRUMENTATION	Flusi	'
<u>5</u>	+	0.0 /				MIN	ERALOGY	\dashv			124 _	
	\	\			//////	\·		1				
1 -		\ /				SANDY CLAY (CL	_) n stiff, low plasticity,	-				
-		\/				fine to medium gra	ined.	- 1				
] HA	-1	Λ	60	4.1		· ·		_1				
-		/ \										
		/ \						-				
5	/	5.0				OU TV CAND (OM						
	\	5.0				SILTY SAND (SM) Light brownish gra	y, moist, loose, well	Ⅎ				
						graded, very fine to	medium grained.	1				
- s	,		42	9.1	11111							
1 1 °	'	\	42	9.1				-1				
		_ \ \				-saturated.		1				
+	-	9.0				SANDY SILT (ML)	1	\dashv				
10		0.0				Light brownish gra		ゴ				
_						grained.		4				
								- 1				
								1				
1 -						-very dark brown.		\dashv				
						WELL GRADED S	AND (SW)					
S	,		128	3.2		Light brownish gra fine to medium gra	y, moist, loose, very	4				
15	-		120	3.2		-		-1				
						SILTY SAND (SM)		_				
1 -						Light greenish gray	/, wet, well graded.					
1]								1				
								-				
		19.0 19.0										X//
20 -		19.0						- 1				
								コ				
								-				
1 1								j				
								4				
								\dashv				
								1				
25 S	3		124	2.4								
23-								\dashv				
						WELL OF LEES O	AND (CIAI)	_]				
						WELL GRADED S Reddish yellow, ve	ry fine to coarse	\dashv				
						\grained, trace silt.						
						CLAYEY SAND (S	(moiet loose ven:	-				
		29.0				fine to coarse grain	moist, loose, very ned, medium plastic.					
20	\top	29.0				SILTY SAND (SM)		\exists				
30						Light greenish gray fine to medium gra	γ, wet, loose, very ined.	\dashv				



PROJECT NUMBER:

423783.FI.WI BORING NUMBER:

IR78GW98-MCH SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.77 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing EAST, NORTH (UTM Z18 NAD83, meters): 286646.40, 3839644.31 WATER LEVEL: --START: 7/26/2011 END: 7/26/2011 LOGGER: A.Guilfoyle/CLT DEPTH BELOW SROUND SURFACE SOIL DESCRIPTION COMMENTS WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM INTERVAL (ft) RECOVERY (inches) SAMPLE TYPE COLOR, (mdd) GRAPHIC Surface Completion: DEPTH OF CASING, DRILLING MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY SILTY SAND (SM) Light greenish gray, wet, loose, very fine to medium grained. S4 3 84 35 39.0 39.0 40 SAND (SW) very fine to coarse grained, trace silt, moderately cemented with 1-in shells. 96 0 45 SILTY SAND (SM)
Dark gray, medium dense, poorly graded, very fine grained. 49.0 -well graded, very fine to coarse 49.0 grained. 50 134 0 55 -moist, dense, poorly graded, very fine to fine sand, gravel-sized shell 59.0 60 (soil description on next page)



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI IR78GW98-MCH

Soil Boring Log

SHEET 3 OF 4

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.77 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286646.40, 3839644.31 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing

EAST, NORTH	-	8 NAD83, m	eters): 286			DRILLING METHOD AN					
WATER LEVE	L: I	1		STA I	RT: 7/26/2011		ND:	7/26/2011		A.Guilfoyle/C	
PAC		≿	ING.	90		IL DESCRIPTION E, USCS GROUP SYMBOI	_,	CO	MMENTS	WEI DIAGF	LL RAM
DEPTH BELOW GROUND SURFACE (ft) SAMPLE	TYPE	(ft) RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	MOISTUI	COLOR, RE CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE MINERALOGY		RATE, DRILLII	SING, DRILLING NG FLUID LOSS, TRUMENTATION	Surface Comple Flush	e
65	69.0	140	0		SILTY SAND Light grav. we	(SM) t, medium dense, well fine to medium grained.					
70	69.0				grained, trace	ose, very fine to medium e silt. strongly cemented, large oken up by rig (3-in dia.).		8-in temporary casing bgs	installed to 70 feet		
75	79.0		0								
80	79.0				fine grained, g fragments.	(SM) pist, dense, very fine to gravel-sized shell shell fragments.					
85		140	1.1		SAND (SW) Light gray, lor grained, trace	ose, very fine to medium					
							-				
90	90.0)					_				
					(soil description	on on next page)	-				
							_	Boring drilled to 91.0'	bgs to set well.	1 14 11	1 1 1 1 1 1



PROJECT NUMBER:	BORING NUMBER:					
423783.FI.WI	IR78GW98-MCH	SHEET	4	OF	4	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.77 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286646.40, 3839644.31 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing

		IM ∠18 N	AD83, met	ters): 286			DRILLING METHOD A			-	-	
WATER L	EVEL:			1	STA	RT: 7/26/2011		END: 7/2	6/2011		LOGGER : A.	Guilfoyle/CLT
DEPTH BELOW GROUND SURFACE (ft)			_	Ő N	g		DESCRIPTION USCS GROUP SYMBO	, I		COMMENTS		WELL DIAGRAM
SELC SURF	9 0	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAIVIL,	COLOR, CONTENT, RELATIVE)L,	DED	TH OF CASING DDI	LLING	
TH BE ND SU (ft)	SAMPLE TYPE	TERV (ft)	(CO)	CREEN (ppm)	F	MOISTURE	CONTENT, RELATIVE ENSITY OR	E	RAT	TH OF CASING, DRI E, DRILLING FLUID	LLING LOSS,	Surface Completion:
COUN	S,	Z	RE (Q.	GR/	CONSISTEN	CY, SOIL STRUCTUR	E,	TES	TŚ, & INSTRUMENT	ATION	Flush
GR				ш		M	INERALOGY					
-						End of Boring Lo	og at 90' bgs					-
						Abbreviations:						=
_						bgs - below grou	ind curface	4				_
_						BTOC- below to	p of casing	- 1				-
95_						ft - feet	_	ュ				
_						HA - Hand Auge in - inch	er	4				_
-						NM - Not Measu						-
						NS - Not Sample PID - photo ioniz	ed zation detector	1				
_						S - Sonic Run	Lation detector	4				-
-								- 1				-
								1				
100								- 4				-
100								-				_
								1]
_												-
_								- 1				-
								1				_
-												-
												_
105_								4				_
_								-				-
								1				
_								4				_
-												-
_								1]
_								- 4				-
110								- 1				-
_								コ				
_												-
-								- 1				-
								1				_
-												-
-								1				-
445								7				
115_								\dashv				
] -								4				7
-												_
1 _												_
_								4				-
-												-
120_								ユ				_
-								4				-
-								-				-
								1_				



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW99-MCH

SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 28.30 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286826.79, 3839582.21 DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing to 80-ft, 8-in to 40-ft

EAST, NO	ORTH (U	TM Z18 N/	AD83, met	ters) : 286	826.79, 3	8839582.21	DRILLING METHOD AN	ID EC	QUIPMENT: Mite-e-S	Sonic Rig, 6-in casing to 8	80-ft, 8-in to 4	40-ft
WATER L	EVEL: 9.	3 ft BTOC	(9/16/201	1)	STA	RT: 7/26/2011		ND:	7/26/2011		J.Albano/CL	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAMI MOISTUI CONSISTI	DIL DESCRIPTION E, USCS GROUP SYMBOI COLOR, RE CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE MINERALOGY		DEPTH OF RATE, DRIL	COMMENTS CASING, DRILLING LLING FLUID LOSS, NSTRUMENTATION	WE DIAG Surfac Compl Flush	RAM
- - - - - - 5_	HA-1	5.0	60	0		sand. SAND (SP) Light gray, loc		-				
- - - - - - 10	S1	10.0	12	0		grained. SANDY CLA' Tan, slightly r grained sands	moist, soft, very fine to fine	9 -				
15	S2	20.0	12	0								
25	S3	30.0	12	0		debrisdary grey, we	v moist, soft, plastic, wood et, very soft. et, loose, very fine to fine					



PROJECT NUMBER:

423783.FI.WI BORING NUMBER:

IR78GW99-MCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.30 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286826.79, 3839582.21 DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing to 80-ft, 8-in to 40-ft

	•			-		3839582.21				te-e-Sonic Rig, 6-in casing to 8		
WATER L	EVEL: 9.	3 ft BTOC	(9/16/201	1)	STA	RT: 7/26/2011		ND:	7/26/2011		J.Albano/Cl	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (indhes)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME	L DESCRIPTION , USCS GROUP SYMBOI COLOR, E CONTENT, RELATIVE DENSITY OR NCY, SOIL STRUCTURE MINERALOGY		RATE	COMMENTS H OF CASING, DRILLING , DRILLING FLUID LOSS, S, & INSTRUMENTATION	DIAG	ELL GRAM ce oletion:
35	S4	30.0	120	0		SAND (SP) Light gray, wet grained. -medium dense -slightly moist, limestone, qua fragments.	, loose, very fine to fine	-				
40		40.0				-wei, irace whi	te siteli iragments.	_				
45	S 5	50.0	120	0		-dense, partiall	y cemented.		8-in temporary bgs	y casing installed to 40 feet		
55	S6	50.0	120	0		-dark gray, ver to fine grained	y moist, loose, very fine I.					



PROJECT NUMBER:	BORING NUMBER:					
423783.FI.WI	IR78GW99-MCH	SHEET	3	OF	3	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.30 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286826.79, 3839582.21 DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing to 80-ft, 8-in to 40-ft

	•			•		3839582.21	DRILLING METHOD			e-e-Sonic Rig, 6-in casing t	
WATER L	EVEL: 9.:	3 ft BTOC	(9/16/201	1)	STA	RT: 7/26/2011	# BEGGBIRTION	END:	7/26/2011		R : J.Albano/CLT
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (indhes)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAMI MOISTUI CONSISTI	IL DESCRIPTION E, USCS GROUP SYMB COLOR, E CONTENT, RELATIV DENSITY OR ENCY, SOIL STRUCTUF MINERALOGY	Έ	RATE,	COMMENTS OF CASING, DRILLING DRILLING FLUID LOSS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
65	S7		120	0		fossils varryin in length.	moist, medium dense, g from fragments to 0.5	5-in - - - - - - - - - -			
-		/ \				Medium gray,	dense, trace silt.	-			
70		70.0									
75	\$8	80.0	120	0							
85						Abbreviations bgs - below gi BTOC- below ft - feet HA - Hand Au in - inch NM - Not Mea	round surface top of casing ger asured ipled nization detector		Boring drilled to	0 80.5' bgs to set well.	
90								- - - - -			- - - -



PROJECT NUMBER:

423783.FI.WI BORING NUMBER:

IR78GW100-MCH SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 30.00 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing EAST, NORTH (UTM Z18 NAD83, meters): 286574.73, 3839558.00 WATER LEVEL: 17.3 ft BTOC (9/16/2011) START: 7/30/2011 END: 7/30/2011 LOGGER: J.Albano/CLT DEPTH BELOW SROUND SURFACE SOIL DESCRIPTION COMMENTS WELL PID SCREENING **GRAPHIC LOG** SOIL NAME, USCS GROUP SYMBOL, DIAGRAM INTERVAL (ft) RECOVERY (inches) SAMPLE TYPE COLOR, (mdd) Surface Completion: DEPTH OF CASING, DRILLING MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION DENSITY OR CONSISTENCY, SOIL STRUCTURE, Stick up MINÉRALOGY SILT/GRAVEL FILL (ML/GW) 0.0 Brown silt and gray gravel, dry, loose. HA-1 60 NM SILTY SAND (SM)
Tan to orange, moist, loose, fine to very fine grained. 5.0 5.0 S1 60 0 10 10.0 10.0 SAND (SP) Light gray, wet, loose, fine to very fine 15 0.6 S2 120 20 20.0 20.0 25 S3 120 0.2 30 30.0



PROJECT NUMBER: **BORING NUMBER:** 423783.FI.WI

IR78GW100-MCH

SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR: Miller Drilling of Nashville TN ELEVATION: 30.00 ft above sea level

DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing EAST, NORTH (UTM Z18 NAD83, meters): 286574.73, 3839558.00 WATER LEVEL: 17.3 ft BTOC (9/16/2011) START: 7/30/2011 END: 7/30/2011 LOGGER: J.Albano/CLT DEPTH BELOW 3ROUND SURFACE SOIL DESCRIPTION COMMENTS WELL PID SCREENING **GRAPHIC LOG** SOIL NAME, USCS GROUP SYMBOL, DIAGRAM INTERVAL (ft) RECOVERY (inches) SAMPLE TYPE COLOR, (mdd) Surface Completion: DEPTH OF CASING, DRILLING MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY SAND (SP) Light gray, wet, loose, fine to very fine 30.0 grained. 35 120 S4 0 40 40.0 40.0 SILTY SAND (SM)
Medium gray, fine to very fine grained, partially cemented clasts, fossil and shell fragments present. 45 S5 120 0 SAND (SP)
Medium gray, wet, loose, fine to very fine grained, no shells. 50 50.0 50.0 55 S6 120 1.8 60 60.0 6Q.D



PROJECT NUMBER:	BORING NUMBER:					_
423783 FI WI	IR78GW100-MCH	CHEET	2	ΩE	2	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 30.00 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing EAST, NORTH (UTM Z18 NAD83, meters): 286574.73, 3839558.00 WATER LEVEL: 17.3 ft BTOC (9/16/2011) START: 7/30/2011 END: 7/30/2011 LOGGER: J.Albano/CLT DEPTH BELOW GROUND SURFACE (ft) SOIL DESCRIPTION COMMENTS WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM INTERVAL (ft) (inches) SAMPLE TYPE COLOR, (mdd) GRAPHIC Surface Completion: DEPTH OF CASING, DRILLING MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, DENSITY OR Stick up TESTS, & INSTRUMENTATION CONSISTENCY, SOIL STRUCTURE, MINÉRALOGY SILT (ML) Light gray, wet, loose, no cementation, shells fragments present. SAND (SP) Medium gray, wet, loose, fine to very fine grained, no shells. 65 S7 120 1.8 70 70.0 End of Boring Log at 70' bgs Abbreviations: Boring drilled to 71.0' bgs to set well. bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured 75 NS - Not Sampled PID - photo ionization detector S - Sonic Run 80 85 90



PROJECT NUMBER: **BORING NUMBER:** 423783.FI.WI

IR78GW101-MCH

SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.69 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286505.84, 3839489.98 DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing WATER LEVEL: 13.6 ft BTOC (9/16/2011) START: 7/28/2011 END: 7/28/2011 LOGGER: J.Albano/CLT DEPTH BELOW SROUND SURFACE SOIL DESCRIPTION COMMENTS WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM INTERVAL (ft) RECOVERY (inches) SAMPLE TYPE COLOR, (mdd) GRAPHIC Surface Completion: DEPTH OF CASING, DRILLING ŧ MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION DENSITY OR Stick up CONSISTENCY, SOIL STRUCTURE, MINERALOGY SILT (ML)
Brown, medium stiff. 0.0 HA-1 60 NM SANDY CLAY (CL)
Orange and tan mottled, slightly moist, 5 5.0 medium stiff, fine to very fine grained S1 48 0.5 10 10.0 10.0 SAND (SP)
Tan, wet, loose, fine to very fine grained. 15 S2 120 0.7 SILTY SAND (SM)
Dark gray, wet, loose, fine to very fine grained. SAND (SP) Gray, wet, loose. 20 20.0 20.0 CLAYEY SAND (SC)
Light gray, wet, loose, fine to very fine grained. SANDY CLAY (CL) Light gray, wet, medium stiff, fine to very fine grained. 25 120 S3 0 SAND (SP) Light gray, wet, loose, medium to fine 30 30.0



PROJECT NUMBER: BORING NUMBER:

423783.FI.WI IR78GW101-MCH

Soil Boring Log

SHEET 2 OF 3

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.69 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

FAST_NORTH (UTM 718 NAD83 meters) : 286505 84 3839489 98 DRILLING METHOD AND EQUIPMENT : Mite-e-Sonic Rig. 6-in casing

EAST, NOF	RTH (U	TM Z18 N	AD83, me	ters) : 286	505.84, 3	3839489.98	DRILLING METHOD AI	ND EQ	UIPMENT: Mite-e-Sonic	Rig, 6-in casing		
WATER LEY	VEL: 13	3.6 ft BTO	0 (9/16/20	11)	STA	RT: 7/28/2011		ND: 7	7/28/2011	LOGGER :		
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME MOISTUE CONSISTE	IIL DESCRIPTION E, USCS GROUP SYMBO COLOR, CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE MINERALOGY		COMM DEPTH OF CASI RATE, DRILLING TESTS, & INSTR	FLUID LOSS,	WE DIAG Surfac Comp Stick t	RAM
35	S4	40.0	120	0		graineddark gray.	et, loose, medium to fine t, medium dense, fine to ned, partially cemented, nts present.					
45	S5	50.0	120	0		-loose, no cer fragments.	nentation, few shell					
55	S6	60.0	120	1.9		SANDY CLA' Medium to da stiff, fine to ve fragments pre	rk gray, slightly moist, ry fine grained, shell sent.					
_		60.0				(soil description	on on next page)	-				



PROJECT NUMBER:

423783.FI.WI BORING NUMBER:

IR78GW101-MCH SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 28.69 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286505.84, 3839489.98 DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing WATER LEVEL: 13.6 ft BTOC (9/16/2011) END: 7/28/2011 LOGGER: J.Albano/CLT START: 7/28/2011 DEPTH BELOW SROUND SURFACE COMMENTS SOIL DESCRIPTION WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM INTERVAL (ft) RECOVER SAMPLE TYPE (inches) COLOR, (mdd) GRAPHIC Surface Completion: DEPTH OF CASING, DRILLING MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, DENSITY OR Stick up TESTS, & INSTRUMENTATION CONSISTENCY, SOIL STRUCTURE, MINERALOGY CLAYEY SAND (SC)
Medium gray, slightly moist, medium dense, fine to very fine grained, shell fragments present. -sandy limestone, cemented shells in sand matrix. SAND (SP) Light gray, moist, loose, trace shell 65 S7 120 0.3 fragments. 70 70.0 End of Boring Log at 70' bgs Abbreviations: Boring drilled to 71.0' bgs to set well. bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured 75 NS - Not Sampled PID - photo ionization detector S - Sonic Run 80 85 90



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI

IR78GW102-MCH

SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC	PROJECT :	Site 78 Additional Investigation	LOCATION: Hadnot Point, MBC Camp Leieune, N	VC.

DRILLING CONTRACTOR : Miller Drilling of Nashville TN ELEVATION : 25.17 ft above sea level

DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing EAST, NORTH (UTM Z18 NAD83, meters) : 286233.80, 3839732.88

WATED I				-				POOCED :	A Cuilfoulo/C	
	EVEL: 13	3.41 ft BTC	00 (9/16/2		SIA	RT: 8/2/2011	END: 8	8/2/2011 LOGGER : COMMENTS	A.Guilfoyle/C	
AC AC			>-	NG NG	၅၀	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOI		COMMENTS	WE DIAGI	
SUR!	SAMPLE	INTERVAL (ft)	RECOVERY (inches)	CREEN (ppm)	3RAPHIC LOG	COLOR, MOISTURE CONTENT, RELATIVE	-,	DEPTH OF CASING, DRILLING	Surfac	
TH BE	AMF	H #	ind)	SCRI (pp	Ŧ	MOISTURE CONTENT, RELATIVE DENSITY OR		RATE, DRILLING FLUID LOSS,	Compl	etion:
DEPTH BELOW GROUND SURFACE (ff)	S	≧	R -	PID SCREENING (ppm)	GR.	CONSISTENCY, SOIL STRUCTURE	,	TESTS, & INSTRUMENTATION	Stick u	ip
_ R		/		-	//////////////////////////////////////	MINERALOGY	-		DSA	DS.
-		0.0				CLAYEY SAND (SC) Pale yellow, dry, loose, very fine to fine	, -			
		$ \setminus / $				grained.	1			K/Z
_		$ \setminus / \mid$								
-	HA-1	X	60	NM			Ⅎ	Lithology from 0-60' taken from		
		$ \ / \ $					1	IR78GW104-LCH		
_		/				-light olive brown with iron oxide staining, medium dense.				
5	-	5.0				Stairing, medium dense.	-1			
_		5.0				-very dense, moderately plastic.	コ			
-		$ \setminus / $					-			
		$\mid \; \lor \; \mid$								
_	S1	$\mid \wedge \mid$	48	NM			4			
-	-	/								
		9.0								
10 -		9.0				SANDY CLAY (CL) Light olive brown with iron oxide	-			
10	•	\ /				staining, dry, medium stiff, moderately	\dashv			
		\ /				plastic.				
-		$ \setminus $				SILTY SAND (SM) Very dark grayish brown, wet, loose,	-			\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
-	-	$ \setminus $				fine grained sand, trace clay.	7			
		$ \setminus / \mid$				SAND (SP)				
_		V				Light olive brown, wet, loose, fine to medium grained, trace silt.	-			$\langle \rangle \rangle \rangle$
	S2	ΙXI	120	NM		mediam grained, trace sit.				
15		/\					4			
-		/ \				SAND (SW)				
		/ \				Yellowish brown, wet, loose, coarse	1			
_						grained.				
-		/ \				CLAYEY SAND (SC)				
]	/ \				Light brownish gray, loose, medium]			
-		19.0				dense, very fine to fine grained.	-{			
20	1	\					」			
_		\					4			\mathbb{K}/\mathbb{A}
-										
		$ \setminus $								
_		$ \setminus / \mid$				SANDY CLAY (CL) Very dark grayish brown, wet, soft,				
-		$ \ \ $				highly plastic, fine to medium grained	- 1			
		I	400			sand.	4			
25	S3	/\	120	NM		CLAYEY SAND (SC) Very dark grayish brown, wet, loose,				
1		/\			* <i>****</i>	very fine to coarse grained.				
-	-	/ \				SAND (SW)	4			
-						Yellowish brown, wet, loose, very fine to coarse grained.			X //	
]						1			
-		/ \			::::::					
-		29.0					┨			
		29.0				SAND (SP)				
30						Yellowish brown, wet, loose, very fine to fine grained.	\dashv			



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW102-MCH
SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 25.17 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286233.80, 3839732.88 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing

WATER L								8/2/2011	ersaSonic Rig; 6-in casing	: A.Guilfoyle/0	CLT
			0/10/2	1		SOIL DESCRIPTION	LIVD.	0/2/2011	COMMENTS	WE	
ELOW	ا ب	/AL	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, USCS GROUP SYMBO COLOR,	L,			DIAG	RAM
TH BE ND SL (#)	SAMPLE	INTERVAL (ft)	ECOV (inche	SCREEN (ppm)	APHI(MOISTURE CONTENT, RELATIVE DENSITY OR		RATE	TH OF CASING, DRILLING E, DRILLING FLUID LOSS,	Surfac Compl Stick u	e letion:
DEPTH BELOW GROUND SURFACE (ft)	S	_	22	PID	GR.	CONSISTENCY, SOIL STRUCTURE MINERALOGY	,	TEST	S, & INSTRUMENTATION	Stick t	тb
						SAND (SP)	_				
_		$ \cdot $				Yellowish brown, wet, loose, very fine to fine grained.	-				
_						SAND (SW)	_				
_						Light gray, wet, loose to medium dense very fine to coarse grained, trace silt.	е, _				
25 -	S4		115	NM		vory mile to obtained gramma, adde ont.	_				
35							_				
-							-				
_							-				
_							_				
_		39.0					-				
40		39.0					-				
_		$ \cdot $					_				
_							-				
_							_				
_							-				
-	S5		72	NM			-				
45							_				
_							_				
_							_				
_											
-		49.0					-				
50		49.0				No Recovery.					
		$ \cdot $					_				
_							-				
-							-				
_							-				
_	S6		48	NM			_				
55	30		40	INIVI			_				
-						SAND (SP) Dark gray, wet, loose, fine to medium	-				
_						grained, trace silt.	-				
-							=				
-		_ \					-				
1 -		59.0 59.0				SAND (SW)					
60	S7	60.0	12	NM		Pale olive, wet, loose, very fine to medium grained, some silt, trace	-				∄∄
	1				::::::	gravel-sized shell fragments.		1			$\exists : : \exists$



PROJECT NUMBER:	BORING NUMBER:				
423783.FI.WI	IR78GW102-MCH	SHEET	3	OF	3

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 25.17 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286233.80, 3839732.88 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing

								Versasonic Rig, 6-in casing	A 0
WATER L	EVEL: 13	3.41πΒΙ	DC (9/16/2		SIA		D: E		A.Guilfoyle/CLT
DEPTH BELOW GROUND SURFACE (ft)	щ	'AL	ERY s)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL,		COMMENTS	WELL DIAGRAM
TH BE	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	SCREEN (ppm)	APHIC	COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS,	Surface Completion:
DEP 3ROUI	S	Z	8 -	PID 8	GR/	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		TESTS, & INSTRUMENTATION	Stick up
-						SAND (SW) Pale olive, wet, loose, very fine to	彐		
-						medium grained, some silt, trace gravel-sized shell fragments.	1		
-						gravor orzed chen magnionio.	1		
							=		
65	S8		91	0			Ⅎ		
_							\exists		
-							4		
-							7		
-							7		
70		70.0				End of Boring Log at 70' bgs	4		
_						Abbreviations:	1	Boring drilled to 71.0' bgs to set well.	
_						bgs - below ground surface	1	Downing annious to 1 110 agos to doc moin	-
-						BTOC- below top of casing ft - feet	1		- -
-						HA - Hand Auger in - inch	1		-
75						NM - Not Measured NS - Not Sampled	4		_
-						PID - photo ionization detector S - Sonic Run	4		-
-							4		_
-							4		-
-							1		_
80							4		_
_							1		_
_							\exists		_
-							\exists		-
-							7		-
85							7		-
_							\exists		-
							1		-
] =							=		-
-							=		- -
00 -							‡		-
90							ㅓ		_
							\exists		-



PROJECT NUMBER: BORING NUMBER:

423783.FI.WI IR78GW103-MCH

Soil Boring Log

SHEET 1 OF 4

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 25.19 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing EAST, NORTH (UTM Z18 NAD83, meters): 286232.07, 3839733.22 LOGGER : A.Guilfoyle/CLT WATER LEVEL: 14 ft BTOC (9/16/2011) END: 8/1/2011 START: 8/1/2011 COMMENTS DEPTH BELOW ROUND SURFACE SOIL DESCRIPTION WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM RECOVERY INTERVAL (inches) SAMPLE COLOR, (mdd) TYPE GRAPHIC Surface Completion: ŧ DEPTH OF CASING, DRILLING € MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, DENSITY OR Stick up TESTS, & INSTRUMENTATION CONSISTENCY, SOIL STRUCTURE, MINERALOGY CLAYEY SAND (SC)
Pale yellow, dry, loose, very fine to fine 0.0 HA-1 60 NM Lithology from 0-100' taken from IR78GW104-LCH -light olive brown with iron oxide staining, medium dense. 5 5.0 -very dense, moderately plastic. 5.0 S1 48 NM 9.0 SANDY CLAY (CL) 9.0 Light olive brown with iron oxide 10 staining, dry, medium dense, moderately plastic. SILTY SAND (SM)
Very dark grayish brown, wet, loose, fine grained sand, trace clay. SAND (SP) Light olive brown, wet, loose, fine to medium grained, trace silt. S2 120 NM 15 SAND (SW) Yellowish brown, wet, loose, coarse grained. **CLAYEY SAND (SC)** Light brownish gray, loose, medium dense, very fine to fine grained. 19.0 19.0 20 SANDY CLAY (CL) Very dark grayish brown, wet, soft, highly plastic, fine to medium grained sand. S3 120 NM **CLAYEY SAND (SC)** Very dark grayish brown, wet, loose, very fine to coarse grained. 25 SAND (SW)
Yellowish brown, wet, loose, very fine to coarse grained. 29.0 SAND (SP)
Yellowish brown, wet, loose, very fine 29.0 30 to fine grained.



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW103-MCH SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 25.19 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286232.07, 3839733.22 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing

WATER L								8/1/2011	rsaSonic Rig; 6-in casing	: A.Guilfoyle/	CLT
				i		SOIL DESCRIPTION			COMMENTS	WE	LL
ELOV	щ	/AL	ERY is)	EN C	007	SOIL NAME, USCS GROUP SYMBO COLOR,	L,			DIAG	RAM
TH BE 4D SU (#)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	CREEN (ppm)	GRAPHIC LOG	MOISTURE CONTENT, RELATIVE		DEPTH RATE.	I OF CASING, DRILLING DRILLING FLUID LOSS,	Surfac Comp	ce eletion: up
DEPTH BELOW GROUND SURFACE (ft)	S,	Z	R E	PID SCREENING (ppm)	GR.	DENSITY OR CONSISTENCY, SOIL STRUCTURE	Ξ,	TESTS	, & INSTRUMENTATION	Stick	up
5		\				MINÉRALOGY SAND (SP)				18/21	K //
_						Yellowish brown, wet, loose, very fine to fine grained.	_				
_						SAND (SW) Light gray, wet, loose to medium dens	e, -				
_	S4		115	NM		very fine to coarse grained, trace silt.	-				
35	34		113	INIVI							
_							-				
_		\					_				
_		\					-				
_		\					_				
_		39.0					_				
40 -		39.0					-				
_							_				
_							_				
-							_				
_							_				
_							_				
45	S5		72	NM			-				
-							_				
_							-				
_							-				
_											
_		49.0					-				
50		49.0				No Recovery.	_				
							_				
_							-				
_		\					=				
_							_				
-		\ \					-				
55 ⁻	S6		48	NM			_				
55		\				SAND (SP)					
_						Dark gray, wet, loose, fine to medium grained, trace silt.	-				
-		\				J,	-				
-							-				
_		59.0					=				
		59.0				SAND (SW)					
60						Light gray, wet, loose, very fine to coarse grained, trace silt, trace to little	_				
					: : : : : :	clay, trace gravel.	_				



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW103-MCH SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 25.19 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286232.07, 3839733.22 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing

WATER LEVEL 14 ft BITCC (91982011) START: 91/2011 END-91/2011 COMMENTS WELL DIAGRAM SOIL DESCRIPTION SOIL MAKE USCS GROUP SYMBOL, MORE THE PROPERTY OF THE										I CAGER	A Guilfoyle	CLT
SAN 100580 very fine to coasse grainers, frace all, frace to little clay, trace grave.	# H	LVLL. 14	ПВТОС	(9/10/201	l				. 6/1/2011			
SAN 100580 very fine to coasse grainers, frace all, frace to little clay, trace grave.	LOW		7	₹ _	NN	LOG	SOIL NAME, USC	S GROUP SYMBOL.			DIAG	RAM
SAN 100580 very fine to coasse grainers, frace all, frace to little clay, trace grave.	1 BEI 3 SUF (ft)	APLE ′PE	ERVA	OVE	REE.	HCI	CO MOISTURE CO	DLOR, NTENT, RELATIVE		DEPTH OF CASING, DRILLING		
SAN 100580 very fine to coasse grainers, frace all, frace to little clay, trace grave.	UND)	SAN	INT B (E E) SC	RAP	DEN	SITY OR		RATE, DRILLING FLUID LOSS, TESTS & INSTRUMENTATION	Comp Stick	oletion: up
SAN 100580 very fine to coasse grainers, frace all, frace to little clay, trace grave.	DE			_	12	Ö	MINE	RALOGY				
S7							SAND (SW)		-			
S7	-		\				coarse grained, trac	e silt, trace to little	1			
89.0			\				clay, trace gravel.]			
89.0	-		\						1			
70_	65 -	S7		115	NM]			
70	05							_	1			
70	_		\]			
70	-		\						1			
70	_		\]			
70	_								1			
70	_								-			
79.0 80	70_		บษ.บ					_				
79.0 80	_								4			
79.0 80	_								1			
79.0 80	_								4			
79.0 80									_			
79.0 80	_								4			
79.0 80_ 79.0 -medium dense. 85_ S9		S8		126	NM				1			
80	75							_	-			
80	_								1			
80	_								-			
80									1			
80	-								1			
80	_]			
85_ S9 216 NM	80		79.0						_			
85_ S9 216 NM	_								-			
85_ S9 216 NM	_								1			
85_ S9 216 NM	_						modium donos]			
85							-medium dense.		Ⅎ			
85 S9 216 NM	_								4			
89.0		S9		216	NM				_			
89.0	85							_	4			
90												
90	-								4			
90 - 89.0						::::::			1			
90light greenish gray, loose. [Soil description on next page]	-					::::::			-			
90									1			
(soil description on next page)	an -						-light greenish gray,	loose.	4			
	30						(soil description on	next page)	1			
	-								-			



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI IR78GW103-MCH SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 25.19 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NO	ORTH (UT	ΓΜ Z18 N	AD83, met	ters) : 286	232.07, 3	3839733.22	DRILLING METHOD ANI	D EQ	QUIPMENT: VersaSonic Rig; 6-in casing		
WATER L	EVEL: 14	ft BTOC	(9/16/201	1)	STA	RT: 8/1/2011		ND: 8		A.Guilfoyle/C	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (indhes)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, MOISTURE I CONSISTEN	. DESCRIPTION USCS GROUP SYMBOL, COLOR, E CONTENT, RELATIVE DENSITY OR NCY, SOIL STRUCTURE, MINERALOGY		COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WE DIAGI Surface Comple Stick u	RAM e etion:
95	S10		114	NM		fragments and land shells.	gray, gravel-sized shell highly cemented sands ell fragments and d.				
100 		99.0				trace grave-siz cemented sand -medium dense	, fine to coarse grained, ted shell fragments and d. e, no gravel-sized shell cemented sand.				
105	S11		123	0		-loose.					
110_		110.0				End of Poring I	og at 110' bas	_			
115						End of Boring L Abbreviations: bgs - below gro BTOC- below to ft - feet HA - Hand Aug in - inch NM - Not Meas NS - Not Samp PID - photo ioni S - Sonic Run	ound surface op of casing er ured led		Boring drilled to 111.0' bgs to set well.		
120											- - - - -



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI

IR78GW104-LCH

SHEET 1 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR : Miller Drilling of Nashville TN ELEVATION: 25.14 ft above sea level

EAST, NORTH (UTM Z18 N.	AD83, me	ters): 286	234.97, 3	3839732.37	DRILLING METHOD AN	ID EQ	UIPMENT: VersaSonic R	ig; 6-in casing to 1	50-ft, 8-in to	130-ft
WATER LEVEL: 14 ft BTOC	(9/16/201 ⁻	1)	STA	RT: 7/29/2011	E	ND: 7	7/29/2011	LOGGER :	A.Guilfoyle/	CLT
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAMI MOISTUR	IL DESCRIPTION E, USCS GROUP SYMBOI COLOR, RE CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE MINERALOGY		COMM DEPTH OF CASII RATE, DRILLING TESTS, & INSTRI	NG, DRILLING FLUID LOSS,	DIAG Surfa	oletion:
HA-1 5.0	60	0.3		grained.	lry, loose, very fine to fine					
S1 9.0	48	0.6		-very dense, r	noderately plastic.	-				
10	120	2.7		staining, dry, moderately pl SILTY SAND Very dark gra fine grained s SAND (SP) Light olive bromedium grain SAND (SW) Yellowish brograined. CLAYEY SAN Light brownisl	own with iron oxide medium dense, aastic. (SM) yish brown, wet, loose, and, trace clay. own, wet, loose, fine to ed, trace silt. wn, wet, loose, coarse	- - - - - - - - - - - - - - - - - - -				
20	120	2.5		SANDY CLA' Very dark gra highly plastic, sand. CLAYEY SAN Very dark gra very fine to cc SAND (SW) Yellowish bro' to coarse grai	Y (CL) yish brown, wet, soft, fine to medium grained ND (SC) yish brown, wet, loose, barse grained. wn, wet, loose, very fine ned.					
30					wn, wet, loose, very fine d.					



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI IR78GW104-LCH SHEET 2 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR : Miller Drilling of Nashville TN ELEVATION: 25.14 ft above sea level

EAST, NO	DRTH (U	TM Z18 N	AD83, me	ters) : 286	<u>234.97, 3</u>	3839732.37	DRILLING METHOD AI	ND EC	QUIPMENT: VersaSonic F	Rig; 6-in casing to 1	50-ft, 8-in to	130-ft
WATER L	R LEVEL: 14 ft BTOC (9/16/2011) START: 7/29/					RT: 7/29/2011		END:	7/29/2011		A.Guilfoyle/0	CLT
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME MOISTUF CONSISTE	IL DESCRIPTION E, USCS GROUP SYMBO COLOR, CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE MINERALOGY		COMM DEPTH OF CASI RATE, DRILLING TESTS, & INSTR	FLUID LOSS,	WE DIAG Surfac Compl Stick u	RAM
-						SAND (SP) Yellowish brow to fine grained	wn, wet, loose, very fine I.	-				
35	S4		115	0.7		SAND (SW) Light gray, we very fine to co	et, loose to medium dense arse grained, trace silt.	e, - - -				
- - - -								-				
40		39.0 \ 39.0						-				
-								-				
45	S5		72	0.9								
-		49.0										
50 -		49.0				No Recovery.						
-								-				
55 -	S6		48	1		SAND (SP) Dark gray, we grained, trace	t, loose, fine to medium silt.	-				
-		59.0						-				
60 <u> </u>		59.0				SAND (SW) Light gray, we coarse grained clay, trace grained	et, loose, very fine to d, trace silt, trace to little evel.	-				



PROJECT NUMBER:	BORING NUMBER:					
423783 FI WI	IR78GW104-I CH	CHEET	2	ΩE	6	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 25.14 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286234.97, 3839732.37 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

	-			•		3839732.37				aSonic Rig; 6-in casing to		
WATER L	EVEL: 14	ft BTOC	(9/16/201	1)	STA	RT: 7/29/2011		ND: 7	7/29/2011		R : A.Guilfoyle	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAM	DIL DESCRIPTION E, USCS GROUP SYMBOL COLOR, RE CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE MINERALOGY		RATE, D	COMMENTS OF CASING, DRILLING PRILLING FLUID LOSS, INSTRUMENTATION	DIAC Surfa	ELL GRAM Ice oletion: up
65	S7	69.0	115	2.3		SAND (SW) Light gray, we	et, loose, very fine to d, trace silt, trace to little					
70		69.0										
75	S8		126	2.7								
80 - - - - - -		79.0 79.0				-medium den	se.					
85	S9	89.0	216	0.5								
90		89.0				-light greenish (soil description	on gray, loose.					



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI

IR78GW104-LCH

SHEET 4 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR : Miller Drilling of Nashville TN ELEVATION: 25.14 ft above sea level

EAST, NORTH (UTM Z	18 NAD83, me	ters) : 286	234.97, 3	3839732.37	DRILLING METHOD AN	ID EQ	QUIPMENT: VersaSonic Rig; 6-in casing to	150-ft, 8-in to 130-ft
WATER LEVEL: 14 ft B	TOC (9/16/201	1)	STA	RT: 7/29/2011		ND: 7		R : A.Guilfoyle/CLT
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE INTERVAL	(ft) RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME MOISTUF CONSISTE	IL DESCRIPTION E, USCS GROUP SYMBOL COLOR, RE CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE, MINERALOGY		COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
95S10	114	0.4		fragments and and shells.	gray, gravel-sized shell I highly cemented sands the sands and the sands are sand the sands and sand sand sand sand sand sand			
100 - 99 - 99 - 105 - S11	114	0.4		-trace gravel-scemented sa	sized shell fragments and nd.			
110	108	0.5		-olive gray, modense.	pist, medium dense to			
						-		



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI IR78GW104-LCH SHEET 5 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR : Miller Drilling of Nashville TN ELEVATION: 25.14 ft above sea level

EAST, NORTH (UTM)	Z18 NAD83, m	eters) : 286	<u>234.97, 3</u>	839732.37	DRILLING METHOD ANI) EC	QUIPMENT: VersaSonic Rig; 6-in casing to 15	60-ft, 8-in to 130-ft
WATER LEVEL: 14 ft E	BTOC (9/16/20	11)	STAI	RT: 7/29/2011		ND:		A.Guilfoyle/CLT
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE	(ft) (RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAMI MOISTUI CONSISTI	OIL DESCRIPTION E, USCS GROUP SYMBOL, COLOR, E CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE, MINERALOGY		COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Stick up
125_ - - - - - -	103	0.7		SAND (SW) Light greenish fragments and and shells.	n gray, gravel-sized shell d highly cemented sands			
	29.0			-olive, loose to coarse graine			8-in temporary casing installed to 130 feet bgs	
135 S14	120	0		Olive, moist, r coarse graine fragments and	medium dense, fine to d, trace grave-sized shell d cemented sand.			
140 - \	39.0							
145 S15	108	0						
150 15	50.0 \			(soil description	on on next page)		Boring drilled to 151.0' bgs to set well.	
-						-		-



1	PROJECT NUMBER:	BORING NUMBER:					
	423783.FI.WI	IR78GW104-LCH	SHEET	6	OF	6	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 25.14 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 286234.97, 3839732.37 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing to 150-ft, 8-in to 130-ft

`						3839732.37	DRILLING METHOD			saSonic Rig; 6-in casing		
WATER L	EVEL: 14	ft BTOC	(9/16/201 ⁻		STA	RT: 7/29/2011	U. DECODIDEION	END: 7/2	9/2011		ER : A.Guilf	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME MOISTUF	IIL DESCRIPTION E, USCS GROUP SYMB COLOR, RE CONTENT, RELATIV DENSITY OR	E	RATE, I	COMMENTS OF CASING, DRILLING DRILLING FLUID LOSS,	;	WELL DIAGRAM Surface Completion: Stick up
DEF	0,	=	α.	PID	GR	CONSISTE	ENCY, SOIL STRUCTUR MINERALOGY	Ε,	TESTS,	& INSTRUMENTATION	'	otick up
						End of Boring	Log at 150' bgs					_
-						Abbreviations		-				-
155 						bgs - below gr BTOC- below ft - feet HA - Hand Au in - inch	top of casing					- - - -
-						NM - Not Mea NS - Not Sam PID - photo io S - Sonic Run	ipled inization detector					- - -
160								_				-
-												- -
- -												-
165_												_
-								-				-
-												- -
-								=				-
170_								4				_
-								-				- -
_								=				- -
-								-				-
175 <u> </u>								-				-
-								1				- - -
_								=				-
180												-
-												-
-								=				-
	1											



PROJECT NUMBER: **BORING NUMBER:** 423783.FI.WI

IR78GW105-MCH

SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR: Miller Drilling of Nashville TN ELEVATION: 24.40 ft above sea level

DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing to 80-ft, 8-in to 50-ft EAST, NORTH (UTM Z18 NAD83, meters): 285761.55, 3838592.01 WATER LEVEL: 12.6 ft BTOC (9/16/2011) START: 8/25/2011 END: 8/25/2011 LOGGER: A.Guilfoyle/CLT DEPTH BELOW 3ROUND SURFACE SOIL DESCRIPTION COMMENTS WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM RECOVERY SAMPLE TYPE INTERVAL (inches) COLOR, (mdd) GRAPHIC Surface Completion: ŧ DEPTH OF CASING, DRILLING € MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, DENSITY OR TESTS, & INSTRUMENTATION CONSISTENCY, SOIL STRUCTURE, MINERALOGY SAND (SP)
Brown, dry, loose, medium grained. 0.0 HA-1 60 NM Lithology from 0-60' taken from IR78GW106-MCH -very pale brown. 5 5.0 **CLAYEY SILT (ML)** S1 28 NM Light olive- brown, wet, soft, sitcky, low plasticity, trace sand. 9.0 No Recovery. SANDY CLAY (CL) Light yellowish brown mottled with 9.0 10 brownish yellow, stiff, high plasticity, medium grained sand. SAND (SP) Light gray mottled with brownish yellow, moist, loose, medium grained. S2 78 NM 15 SILTY SAND (SM) Light gray, moist, medium dense, medium grained sand, trace clay. No Recovery. 19.0 SAND (SP) Light gray, moist, medium dense, 19.0 20 medium grained, trace silt, odor. S3 72 NM 25 No Recovery. 29.0 29.0 (soil description on next page) 30



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW105-MCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 24.40 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 285761.55, 3838592.01 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in casing to 80-ft, 8-in to 50-ft

EAST, NO	ORTH (U	TM Z18 N	AD83, me	ters) : 285	761.55, 3	8838592.01	DRILLING METHOD AN	ID EC	QUIPMENT: VersaSonic Rig; 6-	n casing to 80	-ft, 8-in to 50	O-ft
WATER L	EVEL: 12	2.6 ft BTO	C (9/16/20)11)	STA	RT: 8/25/2011		ND:	8/25/2011	LOGGER :	A.Guilfoyle/0	CLT
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVA (ft) (RECOVEI (inches, (inches, (ppm)) GRAPHICL					OIL DESCRIPTION E, USCS GROUP SYMBOL COLOR, RE CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE MINERALOGY		COMMENT: DEPTH OF CASING, E RATE, DRILLING FLU TESTS, & INSTRUME!	RILLING D LOSS,	WE DIAG Surfac Compl Flush	RAM :e
35	S4	39.0	76	NM		SAND (SP) Light gray, mograined, trace grains, odor. No Recovery.	oist, loose, medium e gravel sized mineral	-				
40		39.0				gained, cobbl of highly cem		-				
45 - - - - - - -	S5	49.0	66	NM		loose sand. No Recovery.	ately cemented, more	-				
50		49.0				gained, trace	et, dense, fine to coarse silt, cobble and gravel- of highly cemented sand.	-	8-in temporary casing installe bgs	d to 50 feet		
55	S6	60.0	96	NM			et, dense, fine to coarse	-				
-		60.0				∖sized pieces o	silt, cobble and gravel- of highly cemented sand.	1	1			



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW105-MCH SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 24.40 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST. NORTH (UTM Z18 NAD83. meters): 285761.55. 3838592.01 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig: 6-in casing to 80-ft, 8-in to 50-ft

EAST, NO	ORTH (U	<u>ΓΜ Ζ18 Ν</u>	AD83, me	ters) : 285	761.55, 3	8838592.01	DRILLING METHOD A	ND EC	QUIPMENT: Vers	aSonic Rig; 6-in ca	asing to 80-ft,	8-in to 50)-ft
WATER L	EVEL: 12	2.6 ft BTO	C (9/16/20	11)	STAI	RT: 8/25/2011		END:	8/25/2011		OGGER : A.G	Guilfoyle/C	CLT
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAM MOISTU	DIL DESCRIPTION IE, USCS GROUP SYMBO COLOR, RE CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURI MINERALOGY		RATE, D	COMMENTS OF CASING, DRIL PRILLING FLUID LE & INSTRUMENTA	OSS,	WE DIAG Surfac Compl Flush	RAM e
65	S7		96	NM		SAND (SP) Gray, moist, I cemented sa sized shell fra		-					
70		70.0				grained, few	ose, fine to medium to little gravel-sized shell	- - - - -					
75						fragments.	sized shell fragments.	- - - - - - - - - - - - - - - - - - -					
80						No Recovery		-					
- - - -						Abbreviations	g Log at 80' bgs s: ground surface v top of casing	-	Boring drilled to	80.0' bgs to set w	vell.		- - -
85 - - - - - -						ft - feet HA - Hand Au in - inch NM - Not Mea NS - Not San	uger asured npled onization detector	- - - - - - -					- - - - - - -
90								- - - - -					- - - - - -



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW106-MCH SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 24.37 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 285762.53, 3838590.83 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in/110-ft, 8-in/80-ft, 10-in/50-ft

	-			-				OPNENT VEISASOI		: A.Guilfoyle/C	
	EVEL. 12 	2.55 ft BTC	00 (9/16/2	l	SIA	RT: 8/23/2011 SOIL DESCRIPTION	END: 8/		DMMENTS		
DEPTH BELOW GROUND SURFACE (ft)			≿ _	PID SCREENING (ppm)	90.	SOIL NAME. USCS GROUP SYM	BOL,		DIVINIENTS	WE DIAGI	
H BEL SUF	SAMPLE	INTERVAL (ft)	RECOVERY (inches)	CREEN (ppm)	GRAPHIC LOG	COLOR, MOISTURE CONTENT, RELAT	VE	DEPTH OF C	ASING, DRILLING	Surfac	ا ہ
HT4 OND	SAM	NTE (RECC (inc	d)	3AP⊦	DENSITY OR		RATE. DRILL	ING FLUID LOSS, STRUMENTATION	Compl	etion:
DE SROI			ш.	E E	<u></u> 5	CONSISTENCY, SOIL STRUCTU MINERALOGY	IRE,	12010, & 1140	THOMENTATION		
_		0.0				SAND (SP)					
-		$ \setminus / $				Brown, dry, loose, medium grained	-				
]	$ \setminus / \mid$					1				
-	HA-1	X	60	0.8							
		$ \ / \ $				-very pale brown.	1				
-		/ \					-				
5		5.0					4				
_		5.0									
_							1				
-	S1		28	0		CLAYEY SILT (ML)					
						Light olive- brown, wet, soft, sitcky,	low 🗍				
_	-	9.0				plasticity, trace sand. No Recovery.	4				
40 -		9.0				SANDY CLAY (CL) Light yellowish brown mottled with					
10		\				Light yellowish brown mottled with brownish yellow, stiff, high plasticity	_				
_		\				medium grained sand.	']				
-		\					-				
_		\					1				
-		\			///////	SAND (SP)					
] -	00	\	70	_		Light gray mottled with brownish ye moist, loose, medium grained.	llow,				
15	S2	\	78	0			- 1				
_		\				SILTY SAND (SM) Light gray, moist, medium dense,					
-		\				\medium grained sand, trace clay.					
_	-	\				No Recovery.	4				
_		\					1				
-		19.0					- 1				
		19.0				SAND (SP)					
20		\				Light gray, moist, medium dense, medium grained, trace silt, odor.	\dashv				
_		\				-	1				
-		\									
_		\					1				
-		\									
		\	70	447			1				
25	S3	\	72	14.7			-				
		\				No Recovery.					
-		\					- 1				
-		\					1				
-		\									
-	1	_ \					1				
-		29.0 29.0				(soil description on next page)					
30		$ \ \ \ $					4				
	1	<u> </u>		1						V///	\vee



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW106-MCH SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 24.37 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 285762.53, 3838590.83 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in/110-ft, 8-in/80-ft, 10-in/50-ft

EAST, NO	ORTH (U	TM Z18 N	AD83, me	ters) : 285	762.53, 3	3838590.83	DRILLING METHOD AN	ID EC	QUIPMENT: VersaSonic Rig; 6-	n/110-ft, 8-in/8	0-ft, 10-in/5	0-ft
WATER L	EVEL: 12	2.55 ft BTC	OC (9/16/2	2011)	STA	RT: 8/23/2011		ND:	8/23/2011	LOGGER : A	A.Guilfoyle/0	CLT
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAMI MOISTUI CONSISTI	DIL DESCRIPTION E, USCS GROUP SYMBOI COLOR, E CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE MINERALOGY		COMMENT: DEPTH OF CASING, E RATE, DRILLING FLUI TESTS, & INSTRUMEN	RILLING D LOSS,	WE DIAG Surfac Compl Flush	RAM :e
35	S4	39.0	76	4.8		SAND (SP) Light gray, mograined, trace grains, odor. No Recovery.	oist, loose, medium e gravel sized mineral	- - - - - - - - - - - - - - - - - - -				
40 - - - -		39.0				SAND (SW) Light gray, we gained, cobbl of highly ceme	et, dense, fine to coarse e and gravel-sized pieces ented sand.	- - - - -				
45	S5	49.0	66	0		loose sand. No Recovery.	ately cemented, more	- - - - - - - -				
50	S6	49.0	84	0		gained, trace	et, dense, fine to coarse silt, cobble and gravel- of highly cemented sand.	-	10-in temporary casing install bgs	ed to 50 feet		
		59.0 59.0				gained, trace	et, dense, fine to coarse silt, cobble and gravel- of highly cemented sand.	- - - - - - - - -				



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW106-MCH SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 24.37 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 285762.53, 3838590.83 DRILLING METHOD AND EQUIPMENT: VersaSonic Rig; 6-in/110-ft, 8-in/80-ft, 10-in/50-ft

WATER L	-			•				<u>QUIPMENT</u> : <u>VersaSonic Rig; 6-in/110-tt, 8-in/8</u> 8/23/2011 LOGGER: A		
_			0/10/2	ĺ		SOIL DESCRIPTION	LIND.	COMMENTS	WEI	
LOW	l	۱ ۲	. K	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, USCS GROUP SYMBOL	_,		DIAGE	
H BEI	SAMPLE	INTERVAL (ft)	RECOVERY (inches)	CREEN (ppm)	皇	COLOR, MOISTURE CONTENT, RELATIVE		DEPTH OF CASING, DRILLING	Surface	e
	SAN	INTE	ZEC (in) SC	RAP	DENSITY OR		RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	Comple Flush	etion:
DEPTH BELOW GROUND SURFACE (ft)			_	1	ا ا	CONSISTENCY, SOIL STRUCTURE MINERALOGY	,			
_		\				SAND (SP)	_			N/A
-		\				Gray, moist, loose, medium grained, no cemented sands, few to little gravel-	-	1		
		\				sized shell fragments.	_			
-		\					-			
	S7	\	84	6.8			_			
65		\								K/A
-		\					-			
-		\				No Recovery.				
-		\					-	1		
_		\					_			
_		69.0					-			
		69.0				SAND (SP)]		
70		\				Gray, wet, loose, medium grained, few to little gravel-sized shell fragments.	_			
_		\				to little graver 3/200 Shell fragments.	-	1		
-		\					_			
-		\					-			
		\					_			
-		\					-	1		
	S8	\	108	2.2			_			
75						-trace gravel-sized shell fragments.				
-		\				-trace graver-sized shell fragments.	-			
-		\					_			
-		\					-			
-		\								
-		79.0				No Recovery.	-			
		79.0				SAND (SW) Gray, wet, loose, fine to coarse				
80		\				gray, wet, loose, line to coarse grained, trace silt, abundant coarse		8-in temporary casing installed to 80 feet		
		\				\grained shell fragments.		bgs		
-		\				SAND (SP) Gray, moist, medium dense, fine	-	1		
		\				grained, trace gravel-sized shell	-	1		
-		\			ППП	fragments. SILTY SAND (SM)		1	\mathbb{K}	
		\				Gray, moist, medium dense, poorly	_			
85 -	S9	\	114	0		graded, very fine to fine grained.	-			
85		\				SAND (SP)		1		
-		\				Gray, moist, medium dense, fine grained, trace gravel-sized shell	_			
-		\				fragments.	-	1		X //
-		\					_	1		
-		\					-	1		
-		89.0				No Recovery.		1		
90 -		89.0				SAND (SW) Gray, wet, dense, fine to coarse	_	1		
] 90		\				gained, trace silt, cobble and gravel-	_	1		
-		\				sized pieces of highly cemented sand	+	4		
	L	\		I		\with large shells.	/		<u> </u>	$-V\lambda y$



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI IR78GW106-MCH SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 24.37 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NO	ORTH (U	ΓΜ Z18 N	AD83, met	ters) : 285	762.53, 3	3838590.83	DRILLING METHOD AN	ND EQ	UIPMENT: VersaSon	ic Rig; 6-in/110-ft, 8-in	/80-ft, 10-in/50-ft
WATER L	EVEL: 12	2.55 ft BTC	OC (9/16/2	011)	STA	RT: 8/23/2011		END: 8	3/23/2011		: A.Guilfoyle/CLT
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME MOISTUR CONSISTE	L DESCRIPTION , USCS GROUP SYMBOI COLOR, E CONTENT, RELATIVE DENSITY OR NCY, SOIL STRUCTURE MINERALOGY		DEPTH OF C RATE, DRILL	OMMENTS ASING, DRILLING ING FLUID LOSS, STRUMENTATION	WELL DIAGRAM Surface Completion: Flush
95	S10		96	0.3		SAND (SP) Gray, moist, m medium graine fragments. No Recovery.	edium dense, fine to od, little gravel-sized she				
100_		99.0				SAND (SP) Gray, moist, m grained, little g fragments.	edium dense, medium ravel-sized shell	-			
105 - - - - - -	S11		108	0.2		-	/el-sized shell fragments	- - - - - :.			
110 - 		110.0				End of Boring I Abbreviations: bgs - below gro BTOC- below t ft - feet HA - Hand Aug in - inch NM - Not Meas NS - Not Samp	op of casing ger sured	-	Boring drilled to 109.	0' bgs to set well.	
115 - - - - - - -						PID - photo ior S - Sonic Run	ization detector				- - - - - - - - -
120 - - - -								- - - - - -			- - - - -



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI IR78GW107 SHEET 1 OF 2

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR : Miller Drilling of Nashville TN ELEVATION: 27.93 ft above sea level

EAST, NORTH (UT)	M Z18 NAD83, m	eters) : 285	<u>635.61, 3</u>	8838445.05	DRILLING METHOD AND	EQUIPMENT:	Mite-e-Sonic Rig, 6-in casing	
WATER LEVEL: 17.5	56 ft BTOC (9/16	/2011)	STA	RT: 8/13/2011	EN	D: 8/13/2011	LOGGER :	B.Propst/CLT
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE	(ft) (ft) RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME MOISTUR CONSISTE	L DESCRIPTION , USCS GROUP SYMBOL, COLOR, E CONTENT, RELATIVE DENSITY OR NCY, SOIL STRUCTURE, MINERALOGY	R/	COMMENTS EPTH OF CASING, DRILLING ATE, DRILLING FLUID LOSS, ESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
HA-1	5.0	NM		No Recovery.		Lithology f	from 0-20' taken from 08-UCH	
S1	60	NM		SANDY SILTY Light gray, wet	, soft.			
15	120	NM		SANDY CLAY Gray, medium SAND (SP) Tan, loose.	(CL) plasticity, some silt.			
25	120	NM		SILTY SAND (Orange, iron no SANDY SILTY Gray, moist, we fine grained. SILTY SAND (Tan, medium cowet, partially of fragments.	odules. CLAY (CL) Pry soft, low plasticity,		lled to 30.0' bgs to set well.	



PROJECT NUMBER:	BORING NUMBER:		
423783 FLWI	IR78GW107	SHEET	2 OF 2

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.93 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 285635.61, 3838445.05 DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing

WATER L						3838445.05 RT: 8/13/2011	DRILLING WETHO		3/13/2011	Mite-e-Sonic Rig, 6-in cas	GGER : B.P	ronst/CLT
- H	1/	.50 11 11 1					DESCRIPTION	LIVD. 0	, 10,2011	COMMENTS	COLIN. D.F	WELL
DEPTH BELOW GROUND SURFACE (ff)		٦	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHICLOG	SOIL NAME,	USCS GROUP SYI	MBOL,		-		DIAGRAM
H BEI	SAMPLE TYPE	INTERVAL (ft)	OVE	SCREEN (ppm)	HC	MOISTURE	COLOR, E CONTENT, RELA	TIVE	DE	PTH OF CASING, DRILLII	NG	Surface
HE OND	SAN	Ä,	ZEC() SC	RAP		DENSITY OR		RA TE	TE, DRILLING FLUID LOS STS, & INSTRUMENTATION	SS, ON	Completion: Flush
3RO			4	Ы	Ō	CONSISTER	NCY, SOIL STRUCT MINERALOGY	URE,		oro, a morromentia	OIV	
						End of Boring L	og at 30' bgs					-
_						Abbreviations:		4				-
												-
-						bgs - below gro BTOC- below to	on of casing	-				-
-						ft - feet		-				-
35						HA - Hand Aug in - inch	er	4				_
35						NM - Not Meas		\dashv				
						NS - Not Samp PID - photo ion	led ization detector	1				-
-						S - Sonic Run						-
												-
_												-
												-
40 -												-
								コ				_
_								4				-
												-
-												-
												-
-												-
45												_
-								4				-
												-
-												-
1 -												-
_								7				-
_												-
50								4				_
-								- 1				-
								- 1				-
_												-
] =								1				-
-												-
								1				-
55								\dashv				_
-												-
-												-
-												-
-												-
1 -												-
60_								-				-
"-								一				_



PROJECT NUMBER:	BORING NUMBER:					
423783.FI.WI	IR78GW108-UCH	SHEET	1	OF	3	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.85 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NO	ORTH (U	TM Z18 NA	AD83, met	ters) : 285	<u>634.40, 3</u>	3838443.52	DRILLING METHOD A	ND EQU	IIPMENT: Mite-e-S	Sonic Rig, 6-in casing to 6		
WATER L	EVEL: 17	7.75 ft BTC	OC (9/16/2	l	STA	RT: 8/11/2011	, DECORPTION	END: 8/			B.Propst/CL	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME MOISTUR CONSISTE	L DESCRIPTION , USCS GROUP SYMBO COLOR, E CONTENT, RELATIVI DENSITY OR NCY, SOIL STRUCTUR MINERALOGY		DEPTH OF RATE, DRIL	COMMENTS CASING, DRILLING LING FLUID LOSS, ISTRUMENTATION	WE DIAG Surfac Comp Flush	RAM ce letion:
- - - - - - 5	HA-1	5.0	60	NM				-				
- - - - - - 10	S1	10.0	60	0		SILTY SAND (fine grained.		-				
15	S2	20.0	120	0		SAND (SP) Tan, loose.	plasticity, some silt.					
25	S3	30.0	120	0		CLAYEY SAN Tan, wet, dens sand.		-				



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW108-UCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.85 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 285634.40, 3838443.52 DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing to 60-ft, 8-in to 40-ft

SOIL DESCRIPTION SOIL AUGUS CONTROL SOIL AUGUS CONT	EAST, NORTH (UTM Z18 NAD83, meters): 285634.40, 3838443.52 DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing to 60-ft, 8-in WATER LEVEL: 17.75 ft BTOC (9/16/2011) START: 8/11/2011 END: 8/11/2011 LOGGER: B.Props										
SAND (SP) Grayish tan, medium dense, fine grained, trace shell pieces. 120 0 Sand (SP) Grayish tan, medium dense, fine grained, trace shell pieces. B-in temporary casing installed to 40 feet bgs S5	> GE						SOIL DESCRIPTION			WELL	
SAND (SP) Grayish tan, medium dense, fine grained, trace shell pieces. 120 0 Sand (SP) Grayish tan, medium dense, fine grained, trace shell pieces. B-in temporary casing installed to 40 feet bgs S5	DEPTH BELOV GROUND SURFA (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENIN (ppm)	GRAPHIC LOC	COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE		RATE, DRILLING FLUID LC	DSS,	Surface
50 S5.0 S5.0 S5.0 S5.0 S5.0 S5.0 S5.0 S5	35	S4	40.0	120	0		Grayish tan, medium dense, fine grained, trace partially cemented sand	,			
Silty Sand (SM) Grayish brown, wet, medium dense, fine grained.	- - - - - -	S5		120	0					40 feet	
(Soil description on flext page)	55_	S6	50.0	120	0		Grayish tan, medium dense, partially cemented sand, shell pieces presnt. SILTY SAND (SM) Grayish brown, wet, medium dense, fine grained.		Poring drilled to 60.0' has to get w	QII.	
	-	-					(soil description on next page)	_	Boring drilled to 60.0' bgs to set we	ell.	_



PROJECT NUMBER:	BORING NUMBER:					
423783.FI.WI	IR78GW108-UCH	SHEET	3	OF	3	

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.85 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 285634.40, 3838443.52 DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing to 60-ft, 8-in to 40-ft

						3838443.52	DRILLING METHOD					
WATER L	EVEL: 17	7.75 ft BTC	OC (9/16/2	1	STA	RT: 8/11/2011	U DECODIDEION	END: 8	3/11/2011		LOGGER : B.	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME MOISTUF CONSISTE	IL DESCRIPTION E, USCS GROUP SYME COLOR, RE CONTENT, RELATIV DENSITY OR ENCY, SOIL STRUCTU	/E	RAT	COMMENTS PTH OF CASING, DR IE, DRILLING FLUID TS, & INSTRUMENT	LOSS,	WELL DIAGRAM Surface Completion: Flush
						End of Boring	MINERALOGY Log at 60' bgs	\dashv				
65						Abbreviations bgs - below gr BTOC- below ft - feet HA - Hand Au in - inch NM - Not Mea NS - Not Sam	ound surface top of casing ger sured pled nization detector					- - - - - - - - - - -
70								- - - - - -				- - - - - - - -
75								- - - - - - -				- - - - - - -
80								- - - - - - - -				- - - - - - - -
85 - - - -								- - - - - - - - - - - - - - - - - - -				- - - - - -
90								- - - - - -				- - - - -



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW109-UCH SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 26.75 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 285725.06, 3838494.15 DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing

EAST, NORTH	<u>(UTM Z18 N</u>	AD83, me	ters) : 285	725.06, 3	3838494.15	DRILLING METHOD A	ND EQ	UIPMENT: Mite-e-Sc				
WATER LEVEL: 16.11 ft BTOC (9/16/2011) START: 7/29/2011							END: 7	7/29/2011	LOGGER : J.Albano/CLT			
DEPTH BELOW GROUND SURFACE (ft) SAMPLE				SOIL NAME	IL DESCRIPTION E, USCS GROUP SYMBO COLOR, CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURI MINERALOGY		DEPTH OF C RATE, DRILL	OMMENTS ASING, DRILLING ING FLUID LOSS, STRUMENTATION	DIAGRA RILLING Surface Completion			
- - - - - - - - - - - - - - - - - - -	5.0	60	0		SAND (SP)	dry, loose, trace fill grave htly moist, very loose, fir						
- - - - - 10	10.0	60	0		CLAYEY SAN Medium gray, very fine grair	very moist, loose, fine to) - - - - -					
15	20.0	120	1.5		grained sand. CLAY (CL) Dark gray, we	oist, medium stiff, very fire, soft, trace silt.	ie					
25	20.0	120	0		dense, fine to partially ceme SAND (SP) Tan, moist, ve	very fine grained sands						



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI

IR78GW109-UCH

SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 26.75 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters) : 285725.06, 3838494.15 DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing

								201PMENT: Mite-e-Sonic Rig, 6-in casing 7/29/2011 LOGGER: J.Albano/CLT						
S C C						SOI	L DESCRIPTION	LIND: 172072		COMM	DMMENTS		WELL	
ELOV URFA	Щ	AL.	ERY s)	PID SCREENING (ppm)) 100	SOIL NAME, USCS GROUP SYMBOL COLOR,		L,				DIAC	SRAM	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE	INTERVAL (ft)	RECOVERY (inches)	SCREEN (ppm)	GRAPHIC LOG	MOISTUR	E CONTENT, RELATIVE DENSITY OR		R	EPTH OF CASII ATE, DRILLING	FLUID LOSS,		oletion:	
S,	S)	Z	R ë	S Ole	GR/	CONSISTENCY, SOIL STRUCTURE		Ξ,	TI	TESTS, & INSTRUMENTATION		Flush	1	
<u> 5</u>		30.0				SAND (SP)	MINERALOGY					K/A	K//	
-		\ /				Tan, moist, ve	ry coarse to medium partially cemented	_						
		\				clasts.	_							
-		$ \ \ \ \ $				SILTY SAND	(SM)							
-		$ \setminus / \mid$				Tan and dark I	orown laminations, y fine grained sands,	_						
35		$ \ \ \ $		_		partially cemer	nted.	_						
_	S4	ΙΛ	120	0				_						
		$ \ / \setminus \ $						_						
_		/ \						_						
-		/						-						
		/ \						_						
40	40	40.0						_						
-	-	40.0						-						
45			120			SAND (SP) Tan, very moist, loose, fine to very fine, trace shell fragments.	_							
							gments.	=, _						
								_						
								_						
	-				to very fine, presents with the fragments with the fragments with the fragments with the fragment fragment fragments and the fragment fragment fragments are fragments.		_							
-	S5			0				-						
_						SAND (SW) Tan, very moist, medium dense, coarse to very fine, partically cemented, shell fragments with trace bivalve fossils.								
- - -							·e _	1						
							-				(7 %).	(F 10)		
_	•	/ \				wet, very soft to soft, very sticky, no						-		
50		50.0					_							
_		50.0	120			cementation, s	hell fragments.	_						
55_				0				_						
								_						
						SILTY SAND (SM) >50% bivalve shells, large bivalve	_							
							_							
						nodules.		-						
	S6							-						
		$ \ / \setminus $						_						
-						SANDY SILT	ML)	-						
						Medium gray, slightly moist, loos medium dense, trace shell fragm	slightly moist, loose to	e to]						
							, a goo chea nagmonto.	_						
60_		60.0												
1 -						(soil descriptio	n on next page)	-						
												1.25.32	1.75.47	



PROJECT NUMBER:	BORING NUMBER:					
423783.FI.WI	IR78GW109-UCH	SHEET	3	OF	3	

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 26.75 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 285725.06, 3838494.15 DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing

WATER L						3838494.15 RT: 7/29/2011	DRILLING WETHOD		7/29/2011	e-e-Sonic Rig, 6-in casing	: J.Albano/CLT
_			0/10/2				IL DESCRIPTION	LIND. 7	772972011	COMMENTS	WELL
DEPTH BELOW GROUND SURFACE (ff)		7	. RY	PID SCREENING (ppm)	GRAPHICLOG	SOIL NAME	E, USCS GROUP SYMB	OL,			DIAGRAM
H BEI	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	SCREEN (ppm)	E	MOISTUF	COLOR, RE CONTENT, RELATIV	Æ	DEPTH	OF CASING, DRILLING	Surface
F GN	SAN L	IN IN	REC (in	J) SC	RAP		DENSITY OR		RATE, TESTS	DRILLING FLUID LOSS, s, & INSTRUMENTATION	Completion: Flush
GRO			_	JI d	Ø		ENCY, SOIL STRUCTUF MINERALOGY	KE,		,	
_						End of Boring	Log at 60' bgs	_	Boring drilled t	o 61.0' bgs to set well.	_
-						Abbreviations	:	-			=
						bgs - below gr	round ourfood	- 1			
-						BTOC- below	top of casing				-
						ft - feet HA - Hand Au	gor	1			_
65						in - inch		_			
						NM - Not Mea NS - Not Sam		1			
_						PID - photo io	nization detector	-			_
_						S - Sonic Run					=
-								-			-
								1			_ _
70 -								-			-
_								コ			
-								-			-
								1			- -
-								-			_
								- 1			=
_								-			_
75								4			_
-								-			_
											=
-								-			_
								4			=
_								-			-
80 -											=
								크			_
-								-			=
											=
-								-			=
											<u>-</u>
_								-			_
85											
_								-			=
											_
_											_
1 -											_
-								-			=
											=
90								\dashv			
-											=



25

30

30.0

EAST, NORTH (UTM Z18 NAD83, meters): 285299.92, 3838150.37

PROJECT NUMBER:	BORING NUMBER:				
423783.FI.WI	IR78GW110-MCH	SHEET	1	OF	4

Soil Boring Log

DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

grained.

fine grained.

SILTY SAND (SM)
Yellow-orange and tan-gray, wet, loose,

ELEVATION: 27.24 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

WATER LEVEL: 19.35 ft BTOC (9/16/2011) START: 8/10/2011 END: 8/10/2011 LOGGER : B.Propst/CLT DEPTH BELOW SROUND SURFACE SOIL DESCRIPTION COMMENTS WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM INTERVAL (ft) RECOVERY (inches) SAMPLE TYPE COLOR, (mdd) GRAPHIC Surface Completion: DEPTH OF CASING, DRILLING ŧ MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY 0.0 HA-1 60 NM 5 5.0 No Recovery. NS NM 0 10 10.0 SAND (SP)
Yellow-orange and tan, wet, loose, fine 10.0 15 SILTY SAND (SM)
Gray, wet, soft, fine grained. CLAY (CH) moist, soft, fine grained. 20 S1 240 SANDY CLAY (CL)
Gray to yellow-orange, moist, soft, fine



IR78GW110-MCH

SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.24 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing EAST, NORTH (UTM Z18 NAD83, meters): 285299.92, 3838150.37 WATER LEVEL: 19.35 ft BTOC (9/16/2011) START: 8/10/2011 END: 8/10/2011 LOGGER : B.Propst/CLT DEPTH BELOW SROUND SURFACE SOIL DESCRIPTION COMMENTS WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM INTERVAL (ft) RECOVER SAMPLE TYPE (inches) COLOR, (mdd) GRAPHIC Surface Completion: DEPTH OF CASING, DRILLING ŧ MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINÉRALOGY 30.0 SILTY SAND (SM)
Tan to gray, medium dense, partially cemented sand, trace shell fragments. -increased cemented sand. 35 S2 120 0 40 40.0 40.0 45 SAND (SP)
Light gray, wet, loose to medium dense, S3 120 0 fine grained. 50 50.0 50.0 55 -trace shell fragments. S4 120 0 -partially cemented sand. SILTY SAND (SM) Gray, medium dense, fine grained, trace shell fragments. 60 60.0 6Q.D



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW110-MCH

Soil Boring Log

SHEET 3 OF 4

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.24 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 285299.92, 3838150.37 DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing

WATER L						8838150.37 DRILLING I RT: 8/10/2011		/10/2011	e-Sonic Rig, 6-in casing	B.Propst/CL	т
, BO						SOIL DESCRIPT		10,2011	COMMENTS	WE	
:LOW JRFA	Щ	, AL	RECOVERY (inches)	N N	GRAPHIC LOG	SOIL NAME, USCS GRO COLOR,	UP SYMBOL,			DIAG	RAM
H BE D S(SAMPLE TYPE	INTERVAL (ft)	COVI	CRE (ppm	∺	MOISTURE CONTENT,	RELATIVE	DEPTH C	F CASING, DRILLING RILLING FLUID LOSS,	Surfac Compl Flush	e etion:
DEPTH BELOW GROUND SURFACE (ff)	δ.	Ξ	RE(PID SCREENING (ppm)	GRA	DENSITY OF CONSISTENCY, SOIL S	TRUCTURE,	TESTS, 8	INSTRUMENTATION	Flush	
- R		\ /		ш.		MINÉRALOG	Y			[X//I	K ///
		\ /									
-		\ /				SAND (SP) Grayish tan, saturated, med	dium dense,				
-		$ \ \ $				fine grained, trace shell frag	gments.				
		$ \ \ $					1				
65	S5	$ \bigvee $	120	0			\dashv				
		$ \ \ \ \ \ $					1				
		$ / \rangle$									
-		$ \ / \ \setminus $									
-							1				
70		70.0					\dashv				
-		\					1				
		$ \setminus $									
_		$ \setminus $									
-		$ \setminus $					1				\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
		$ \ \ \ \ \ $					£				
75	S6	 	120	0			4				
	30	$ \ \ \ \ \ \ \ \ \ \ $	120				1				
-		$ \ / \ $									
_		$ \ / \ $					1				
-							1				
-											-
80		80.0				No Recovery.					
		00.0				No recovery.	1				
-							-				
							1				∄34
1 =											
-						SILTY SAND (SM)					∄::}}
85	S7		72	0		Grayish tan, saturated, med fine grained, trace shell frag	dium dense,				∄ 4
1 -	31		12			inio granica, nace sneli liac					
-											3
1 -]						1				
1 -											
-							-				
90		90.0				(coil description on next re-	-	Paring drillad to	90.0' bgs to set well.		
_						(soil description on next page	ge) _	burny united to	ou.u bys to set well.		_



PROJECT NUMBER:	BORING NUMBER:		
423783.FI.WI	IR78GW110-MCH	SHEET	4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 27.24 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 285299.92, 3838150.37 DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing

WATER L						3838150.37 RT: 8/10/2011	DRILLING METHOL		3/10/2011	Wille-e-Soriic Rig, 6	LOGGER : B	Pronet/CLT
WATER E	LVLL. 18	7.55 IL BTC	00 (9/10/2				L DESCRIPTION	END. 6	0/10/2011	COMMENT		WELL
DEPTH BELOW GROUND SURFACE (ft)		ب	≿ _	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME	. USCS GROUP SYM	BOL,				DIAGRAM
H BEL	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	ZEEI pm)	i	MOISTLIB	COLOR, E CONTENT, RELAT	IVE	DE	PTH OF CASING, I	ORILLING	
F 등 F	SAM	ATM E	ECC (inc	SCF.	\ AP		DENSITY OR		RA	TE, DRILLING FLU	ID LOSS,	Surface Completion: Flush
DEF ROL	"	=	œ	PID	. В	CONSISTE	NCY, SOIL STRUCTU	JRE,	I E	STS, & INSTRUME	NIATION	i idon
						End of Boring	MINÉRALOGY Log at 90' bgs					
								1				_
-						Abbreviations:						-
						bgs - below gr	ound surface					=
05 -						BTOC- below t	op of casing					=
95						HA - Hand Aug	ger	-				
						in - inch NM - Not Meas	surad					_
-						NS - Not Samp	oled					-
-						PID - photo ior	nization detector	- 1				-
						S - Sonic Run		1				_
-												-
_												_
100_								_				
-								- 1				-
_								1				=
_												-
												_
_								4				-
_												_
105_								-				_
-								- 1				_
								1				_
-												-
_												_
_												-
-								- 1				-
110_												_
_												=
_								1				_
-												-
1 -								7				=
1 -												-
115_												
-												=
1 -												
-								4				=
												-
-								1				=
-												=
120_												_
-												-
												_



PROJECT NUMBER: BORING NUMBER:

423783.FI.WI IR78GW111-MCH

Soil Boring Log

SHEET 1 OF 4

Son Borning Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 25.81 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing EAST, NORTH (UTM Z18 NAD83, meters): 285143.08, 3838301.21 WATER LEVEL: 17.76 ft BTOC (9/16/2011) START: 8/1/2011 END: 8/1/2011 LOGGER: J.Albano/CLT DEPTH BELOW 3ROUND SURFACE SOIL DESCRIPTION COMMENTS WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM RECOVERY SAMPLE TYPE INTERVAL (inches) COLOR, (mdd) GRAPHIC Surface Completion: ŧ DEPTH OF CASING, DRILLING MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, DENSITY OR TESTS, & INSTRUMENTATION CONSISTENCY, SOIL STRUCTURE, MINERALOGY SILT (ML)
Brown, moist, loose. 0.0 SANDY CLAY (CL)
Tan with orange mottling, slightly moist, medium stiff, fine to very fine grained HA-1 60 NM 5.0 5.0 S1 60 SAND (SP) Medium gray, wet, loose, fine to very fine grained sands. 10 10.0 10.0 CLAYEY SAND (SC)
Medium to dark gray, wet, loose. CLAY (CL) Medium to dark gray, very moist, soft. 15 S2 120 0 -tan to orange, very fine grained sand, 20 20.0 20.0 25 CLAYEY SAND (SC)
Tan to orange, some iron oxide, very S3 120 0 moist, loose, cemented gravel-sized 30 30.0 (soil description on next page)



IR78GW111-MCH

SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 25.81 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing EAST, NORTH (UTM Z18 NAD83, meters): 285143.08, 3838301.21 WATER LEVEL: 17.76 ft BTOC (9/16/2011) START: 8/1/2011 END: 8/1/2011 LOGGER: J.Albano/CLT DEPTH BELOW SROUND SURFACE SOIL DESCRIPTION COMMENTS WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM INTERVAL (ft) RECOVERY SAMPLE TYPE (inches) COLOR, (mdd) GRAPHIC Surface Completion: DEPTH OF CASING, DRILLING MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY SAND (SP)
Medium gray, moist, loose, sand with 30.0 shell fragments. 35 120 S4 0 40 40.0 40.0 SILTY SAND (SM)
Medium gray, wet, loose, fine to very fine grained sands, shell fragments and white toothpick looking fragments (up to 45 0.5-in long). S5 120 0 SAND (SP)
Medium gray, wet, loose, fine to very fine grained sands, shell fragments and white toothpick looking fragments (up to 50 50.0 50.0 0.5-in long). 55 S6 120 0 -moist, medium dense, cemented. -partially cemented. -very moist, loose. 60 60.0 6Q.D



IR78GW111-MCH

SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 25.81 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing EAST, NORTH (UTM Z18 NAD83, meters) : 285143.08, 3838301.21

EAST, NORTH (UTM Z18 NA		•				QUIPMENT: Mite-e-Sonic Rig, 6-in casing	LAULT
WATER LEVEL: 17.76 ft BTC	OC (9/16/2		SIA	RT: 8/1/2011 SOIL DESCRIPTION	END:	8/1/2011 LOGGER : COMMENTS	J.Albano/CLT
GROUND SURFACE (ft) SAMPLE TYPE INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, USCS GROUP SYMBO COLOR, MOISTURE CONTENT, RELATIVI DENSITY OR CONSISTENCY, SOIL STRUCTUR MINERALOGY	Ē	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM Surface Completion: Flush
65	120	0		-very moist, loose.			
70.0 / 70	120	0					
85	120	0		SILTY SAND (SM) Medium gray, moist, dense, fine to verifine grained sands. SAND (SP) Medium gray, very moist, loose, fine to very fine grained sands, partially cemented, shell fragments and white	0 -		
-			·	toothpick looking fragments (up to 0.5 in long). (soil description on next page)		Boring drilled to 91.0' bgs to set well.	



PROJECT NUMBER:	BORING NUMBER:					
423783 FI WI	IR78GW111-MCH	CHEET	4 0	\E	1	

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 25.81 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 285143.08, 3838301.21 DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing

WATER L								8/1/2011	e-e-Sonic Rig, 6-in casing	J.Albano/CLT
GROUND SURFACE (ft)		.7011.010	00 (0/10/2			SOIL DESCRIPTION	LIND. C	5/1/2011	COMMENTS	WELL
-OW		ļ	₹ ~	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, USCS GROUP SYMBO	L,			DIAGRAM
H BEI D SUF	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	ZEE pm)	<u></u>	COLOR, MOISTURE CONTENT, RELATIVE		DEPTH	OF CASING, DRILLING	Surface
E S	SAN	N E	ZECC (inc	SCI (b	₹API	DENSITY OR	- 1	RATE,	DRILLING FLUID LOSS, , & INSTRUMENTATION	Surface Completion: Flush
E PE		_	ш	B B	9	CONSISTENCY, SOIL STRUCTURE MINERALOGY	,	12313	, & INSTRUMENTATION	
						End of Boring Log at 90' bgs				_
_						Abbreviations:	4			_
										_
-						bgs - below ground surface BTOC- below top of casing				=
95						ft - feet	-			-
_						HA - Hand Auger in - inch				
-						NM - Not Measured	- 4			_
_						NS - Not Sampled PID - photo ionization detector				=
-						S - Sonic Run	-			-
_							4			_
100 -							- 1			_
_							7			
_							- 1			_
							- 1			=
-										=
							- 1			_
-							- 1			-
105_										_
-							- 4			_
-										_
_							4			_
_							-			_
_							4			_ _
-							-			=
110_										_
_							-			=
										_
-										-
										_
] -							7			=
-							Ⅎ			=
115_							4			_
-							-			=
-							1			-
-										-
										<u>-</u>
-										=
										_
120_										
1 -										-
							7			=
	l			l		1				



IR78GW112-MCH

SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 26.68 ft above sea level DRILLING CONTRACTOR: Miller Drilling of Nashville TN

DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing to 90-ft, 8-in to 60-ft EAST, NORTH (UTM Z18 NAD83, meters) : 285486.29, 3838106.85

						8838106.85			MENT: Mite-e-Sonic Rig, 6-in casing to 9		
	EVEL: 2	1.56 ft BTC	OC (9/16/2	011)	STA	RT: 8/9/2011		END: 8/9/2		B.Propst/CL	
¥. ACE			_	NG	စ္က		OIL DESCRIPTION E, USCS GROUP SYMBO	.	COMMENTS	WE DIAG	
SELC	ш Щ	AF	/ER' es)	n (n	CLC	SOIL NAIVI	COLOR, RE CONTENT, RELATIVE	∟,	DEDTH OF CACING DOLLING	Surfac	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	MOISTU	RE CONTENT, RELATIVE DENSITY OR		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS,	Compl	etion.
COUR	S)	_ Z	R O	S CII	GR/	CONSIST	ENCY, SOIL STRUCTURE MINERALOGY	<u>:</u> ,	TESTS, & INSTRUMENTATION	Stick u	ір
- R		\		ш.			MINERALOGY			DSA	DS.
-		0.0						- 1			
		$ \setminus / $]			
-		\/						4			
	HA-1	X	60	0							
-	_	$ \ / \ $						4			
-		/ \						-			
5		5.0									V//
-	_	5.0				SANDY SILT	(ML) oose, fine grained.	4			
-		$ \setminus $				Brown, dry, ic	ose, inte grantea.	1			
-		\						4			
-	-		24	0							
		\						1			
-		\									
10_		10.0									
-		10.0				SILTY SAND	(SM) , dry, loose, fine grained.	4			
-		$ \setminus / $				very light tan	, dry, loose, lille grailled.	- 1			
		$ \setminus / \mid$						1			
-		X	60	0				4			
]	$ \ / \ $	00	O							
-	-	/				SAND (SP)					
15		15.0				Light tan, wet	, loose, fine grained.	- 1			
		15.0				SILTY SAND	(SM)				
-	_	$ \setminus / $				SAND (SW)	, wet, soft, fine grained.				
		$ \setminus / \mid$				Tan. drv. loos	e, fine to medium graine	d, 🗍			
-		X	60	0	::::::	trace sand cla	asts.	4			
		$ \ / \ $	00	O							
-								4			<i>X//</i>
20 -		20.0						- 1			
_		20.0				SILTY CLAY	EY SAND (SC)	, –			
-	1	\ /				Gray, wet, me	edium dense, fine grained	" -			
	1	\ /									
-	1	X	60	0				-			
		$ \ / \ $	00	O							
-								4			
25	1	25.0						- 1			
-		25.0				SAND (SP)	C	ユ			
-	1	\ /				Light tan to g	ray, wet, loose, fine	-			
	1	$ \setminus / $									
-	-	X	60	0		SANDY CLA	Y (CL) ray, moist, soft, fine	-			
-	1	/\	00	J		grained.	, 11010t, 00tt, 11110				
	_							-]			
30		30.0						-			
						(soil descripti	on on next page)			$\langle \rangle \rangle$	$\rangle \rangle \langle \gamma \rangle \rangle \langle \gamma \rangle \rangle \langle \gamma $



IR78GW112-MCH

SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCA	TION: Hadnot Point, MBC Camp Leieune, NC
---	--

ELEVATION: 26.68 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

FAST_NORTH (UTM 718 NAD83_meters) : 285486 29 3838106 85 DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig. 6-in casing to 90-ft. 8-in to 60-ft

EAST, NORTH (UTM Z18 N		•	486.29, 3	3838106.85	DRILLING METHOD AN	ND EQUIPM	ENT: Mite-e-Sonic Rig, 6-in casing to 9	
WATER LEVEL: 21.56 ft BT	OC (9/16/2	2011)	STA	RT: 8/9/2011		END: 8/9/20		
DEPTH BELOW GROUND SURFACE (f) SAMPLE TYPE INTERVAL (f) (f)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAM MOISTU CONSIST	DIL DESCRIPTION IE, USCS GROUP SYMBOI COLOR, RE CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE MINERALOGY		COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	ELL GRAM ce pletion: up
35_	60	0		fragments. SILTY SAND Gray, partiall fossilferous s	se to medium dense, sheled (SM) y cemented sand, hell fragments.	- - - - - - - - -		
4040.0	60	0		-decreasing page decreasing fragments.	partially cemented sand, ossilferous shell			
45	60	0				- - - - - - - - -		
50	60	0		silt.	wet, medium dense, trace	- - - - - - - - -		
55	120	0		fossilferous s	edium dense, fine grained hell fragments. partially cemented sand, sand matrix.	,		
60 - 60.0						- - - 8-in bgs	temporary casing installed to 60 feet	



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI IR78GW112-MCH

Soil Boring Log

SHEET 3 OF 4

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 26.68 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 285486.29, 3838106.85 DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing to 90-ft, 8-in to 60-ft

WATER L						3838106.85 DRILLING METHOD A .RT: 8/9/2011	END: 8/	JIPMENT: Mite-e-Sonic Rig, 6-in casing to 9 /9/2011 LOGGER:	B.Propst/CLT
> GE						SOIL DESCRIPTION		COMMENTS	WELL
ELOV URFA	│ ≝ │	\A	ERY 3S)	ENIN (u	070	SOIL NAME, USCS GROUP SYMBO COLOR.	DL,		DIAGRAM
TH BE ND SL (#)	SAMPLE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	COLOR, MOISTURE CONTENT, RELATIVI DENSITY OR		DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS,	Surface Completion: Stick up
DEPTH BELOW GROUND SURFACE (ft)	0)	_	R	PID	g.	CONSISTENCY, SOIL STRUCTUR MINERALOGY	Ε,	TESTS, & INSTRUMENTATION	Stick up
		\ /			: : : : : :	WINTERVIECO			
-		\				SAND (SP)			
-	-	$ \setminus / $				Light tan, wet, medium dense, poorly graded, fine grained.			
_		$ \setminus $							
65		$ \ \ $	120	0			4		
_		$ $	120	O			1		
		$ \ / \ $					1		
-		/				light gray.	=		
-									
70	-	70.0					-		
_		70.0					7		
		$ \rangle $					1		
		$ \setminus / $					1		
_		$ \setminus $				·			
_		$ \ \ $					}		
75	-	X	120	0			4		
-		$ \ / \setminus $					4		
-		$ / \rangle$					- 1		
-		/					- 1		10.10
-	1						1		
80	-	80.0							
-	-	80.0							
-		$ \setminus $							
-		$ \setminus $				SILTY SAND (ML) Light gray, wet, medium dense, fine	-		
		$ \setminus $				grained, trace shell fragments.	1		
		$ \ \ $					4		
85	1	l X	120	0			亅		
-	<u> </u>	$ \ / \ $					+		
] =	-	$ \ / \ $					7		
] =		/					- 1		
		/ \				dance partially comented again	1		
90		90.0				-dense, partially cemented sand.		D : 171 14 00 011 : : : : :	
-						(soil description on next page)		Boring drilled to 90.0' bgs to set well.	-



PROJECT NUMBER:	BORING NUMBER:					
423783.FI.WI	IR78GW112-MCH	SHEET	4	OF	4	

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION : 26.68 ft above sea level DRILLING CONTRACTOR : Miller Drilling of Nashville TN

EAST, NORTH (UTM Z18 NAD83, meters): 285486.29, 3838106.85 DRILLING METHOD AND EQUIPMENT: Mite-e-Sonic Rig, 6-in casing to 90-ft, 8-in to 60-ft

WATER LE	=\/FI · 21	56 ft RTC	C (9/16/2	011)	SΤΔ	RT: 8/9/2011	END: 8/9	JIPMENT: Mite- 0/2011	LOGGER :	B.Propst/CLT
_		.00 11 01 0	00 (0/10/2			SOIL DESCRIPTION	LIND. 0/.	3/2011	COMMENTS	WELL
DEPTH BELOW GROUND SURFACE (ft)		7	. ΒΥ	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, USCS GROUP SYMBO	OL,			DIAGRAM
T BE	SAMPLE	INTERVAL (ft)	RECOVERY (inches)	REE	呈	COLOR, MOISTURE CONTENT, RELATIV	Εl	DEPTH (F CASING, DRILLING	Surface
T NO	SA	INTE	REC (in) SC	RAP	DENSITY OR		RATE, D TESTS, 8	RILLING FLUID LOSS, & INSTRUMENTATION	Surface Completion: Stick up
GRO			_	瞐	O O	CONSISTENCY, SOIL STRUCTUR MINERALOGY	E,	. 20 . 0, 0		
_						End of Boring Log at 90' bgs				_
-						Abbreviations:	-			=
1]						bgs - below ground surface	1			_
-						BTOC- below top of casing	-			-
95						ft - feet				_
-						HA - Hand Auger in - inch	4			_
1]						NM - Not Measured				_
-						NS - Not Sampled PID - photo ionization detector	- 4			-
						S - Sonic Run				_
							4			_
100_							_			
1 -										_
]]			_
-							- 1			-
1]										=
1 -							- 1			-
105							1			- -
105							-			
							1			=
1 -							- 1			_
1 7										_
1 -							- 1			-
							1			=
110							- 1			_
1 7							7			
-							- 1			-
1]							1			=
-							-			_
							1			_
-							- 1			_
115_										
-							-			_
1]							1			=
-										_
]							1			7
-							+			=
1 400							1			= = = = = = = = = = = = = = = = = = = =
120_							\dashv			
							1			7



IR78GW113

SHEET 1 OF 1

Soil Boring Log

DRILLING CONTRACTOR: Drill Pro ELEVATION: 8.92 ft above sea level

DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 EAST, NORTH (UTM Z18 NAD83, meters) : 286585.29, 3839575.01

EAST, NORTH (UT						ETHOD AND EQUIPME		D Dranat/CLT
WATER LEVEL: 11	.42 π Β1Ο 	J (5/25/20)		SIA	RT: 3/31/2012 SOIL DESCRIPTIO	END: 3/31/20	COMMENTS	B.Propst/CLT
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUI COLOR, MOISTURE CONTENT, F DENSITY OR CONSISTENCY, SOIL STI	P SYMBOL, RELATIVE RUCTURE,	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
- - - - - - - - - - - - - - - - - - -	5.0	60	0		SILTY SAND (SM) Tan, loose, fine grained.	-		
- - - - - - - - - - - - - - - - - - -	10.0	60	0		SILTY SAND (SM) Tan/yellow-orange, dry to dar fine grained.	mp, loose, -		
RS-2	15.0	60	0.6		SAND (SP) Yellow-orange, damp, loose, grainedwetcolor change to light gray, m dense, fine grained. SILTY SAND (SM) Gray, wet, medium dense, fin	edium _		
RS-3	15.0	60	0.5		-color change to brown, mois grained, peat, organic. SAND (SP) Light gray, wet, loose, fine gray			
25					End of Boring Log at 20' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run			



PROJECT NUMBER: BORING NUMBER:

423783.FI.WI IR78GW114

SHEET 1 OF 1

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 8.37 ft above sea level DRILLING CONTRACTOR: Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters): 286543.17, 3839648.92 DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2

EAST, NORTH (UTM WATER LEVEL: 14.9					RT: 4/1/2012	METHOD AND EQU FND: 4	1/1/2012		B.Propst/CLT
		0/10/20		OIA	SOIL DESCRIPT		7 1/2012	COMMENTS	WELL
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, USCS GRO COLOR, MOISTURE CONTENT DENSITY O CONSISTENCY, SOIL S MINERALOG	OUP SYMBOL, T, RELATIVE R	RATE,	OF CASING, DRILLING DRILLING FLUID LOSS, & INSTRUMENTATION	DIAGRAM
- - - - - - - - - - - - - - - - - - -	5.0	60	NM		SILTY SAND (SM) Tan, loose, fine grained.	- - - - - -			
	10.0	60	0.7		SILTY SAND (SM) Tan/yellow-orange, dry, me fine grained.	edium dense,			
15 RS-2	10.0	120	0.3		-color change to yellow-ora SAND (SP) Light tan, wet, loose, fine g	-			
20	20.0				End of Boring Log at 20' bg Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization dete RS - Roto Sonic Run	- - - - -			



IR78GW115

SHEET 1 OF 1

Soil Boring Log

CLIENT: NAVFAC	PROJECT: Site 78 Additional Investigation	LOCATION : Hadnot Point, MBC Camp Lejeune, NC	
ELEVATION : 9 64 ft about	a ana laval	DRILLING CONTRACTOR : Drill Dro	

DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 EAST, NORTH (UTM Z18 NAD83, meters): 286825.68, 3839584.88 WATER LEVEL: 5.88 ft BTOC (5/25/2012) LOGGER: B.Propst/CLT START: 3/31/2012 END: 3/31/2012 DEPTH BELOW GROUND SURFACE (ft) SOIL DESCRIPTION COMMENTS PID SCREENING (ppm) WELL SOIL NAME, USCS GROUP SYMBOL, RECOVERY (inches) DIAGRAM INTERVAL (ft) SAMPLE TYPE COLOR, GRAPHIC DEPTH OF CASING, DRILLING MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY SILTY SAND (SM) 0.0 Tan, loose, fine grained. HA-1 60 NM No Recovery. RS-1 36 0 SILTY SAND (SM)
Tan/yellow-orange, moist, medium dense, fine grained. 10 10.0 10.0 -color change to tan, wet, loose/soft. No Recovery. RS-2 12 0 15 15.0 SAND (SP) RS-3 Gray, wet, loose/soft, fine grained. 36 0 20 20.0 End of Boring Log at 20' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured 25 PID - photo ionization detector RS - Roto Sonic Run 30



PROJECT NUMBER: 423783.FI.WI

BORING NUMBER: IR78GW116-MCH

SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, N
--

ELEVATION: 8.17 ft above sea level DRILLING CONTRACTOR : Drill Pro

EAST, NORTH (UTM)	Z18 NAD8	33, meter	rs): 28644	1.82, 383	39635.02 DRILLING METHOD AND EQUIP	MENT: Roto Sonic SR-2	
WATER LEVEL: 11.94	ft BTOC ((3/30/201	12)	STA	RT: 3/28/2012 END: 3/28		B.Propst/CLT
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
HA-1	5.0	60	NM		SILTY SAND (SM) Dark gray, dry, loose.		
RS-1	10.0	60	0		SANDY SILT (ML) Dark gray/tan, dry, loose, fine grained, organic, trace roots. SILTY SAND (SM) Tan/yellow-orange, dry, loose, fine		
	10.0	120	0		grained. SAND (SP) Tan, moist, loose, fine grained. SILTY SAND (SM) Yellow-orange, moist, loose, fine grained. SAND (SP) Tan, moist/wet, loose, fine grainedcolor change to light gray.		
	20.0				SANDY CLAY (CL) Light gray, damp, stiff, fine grained sand, low plasticity. SANDY SILTY CLAY (CL) Light gray, moist, soft, fine grained.		
25		240			SILTY SAND (SM) Tan, wet, loose, fine grained. SAND (SP) Light tan, wet, loose, fine grained. -sandy clay lens @ 27ft.		



IR78GW116-MCH

SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 8.17 ft above sea level DRILLING CONTRACTOR: Drill Pro

DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 EAST, NORTH (UTM Z18 NAD83, meters) : 286441.82, 3839635.02 WATER LEVEL: 11.94 ft BTOC (3/30/2012) END: 3/28/2012 LOGGER: B.Propst/CLT START: 3/28/2012 DEPTH BELOW GROUND SURFACE (ft) SOIL DESCRIPTION COMMENTS WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM INTERVAL (ft) RECOVERY SAMPLE TYPE (inches) COLOR, (mdd) GRAPHIC DEPTH OF CASING, DRILLING MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY SAND (SP) Light tan, wet, loose, fine grained. 35 40 40.0 40.0 45 0 SILTY SAND (SM)
Tan/yellow-orange, wet, loose, fine 50 240 RS-4 SAND (SP) Yellow-orange, wet, loose, fine grained. SILTY SAND (SM) Yellow-orange, fine grained. 55 SANDY SILT (ML)
Tan, dry, dense, fine grained. 2.7 -color change to dark gray. 10.3 SILTY SAND (SM)
Tan/yellow-orange/gray, damp, loose, 60 60.0

fine grained.

(soil description on next page)

6Q.0



IR78GW116-MCH

SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR: Drill Pro ELEVATION: 8.17 ft above sea level

DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 EAST, NORTH (UTM Z18 NAD83, meters): 286441.82, 3839635.02

	-	M Z18 NAI		•				JIPMENT: Roto Sonic SR-2	
WATER L	EVEL: 11.	.94 ft BTO	C (3/30/20	12)	STA	RT: 3/28/2012	END: 3		B.Propst/CLT
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBO COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURI MINERALOGY		COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
65	RS-5		120	1.1		SAND (SP) Tan, wet, loose, fine grained.			
70		70.0		_			ゴ		
75	RS-6	70.0	120	4.3		SILTY SAND (SM) Tan, wet, medium dense, fine grained			
80 <u>-</u>		80.0				trace shell pieces. -color change to gray, loose.	′ - - - -		
- - - - - - 85	D0 7		120	34.1		SILTY SAND (SM) Gray, wet, loose to medium dense, partially cemented sand with shell fragments.	-		
90	RS-7	90.0	120	18.7		SILTY SAND (SM) Gray, wet, dense, fine grained, trace shell pieces.	- - - - - - - - -		
-						•			



PROJECT NUMBER: 423783.FI.WI

BORING NUMBER:

IR78GW116-MCH

SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 8.17 ft above sea level DRILLING CONTRACTOR: Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters): 286441.82, 3839635.02 DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2

	-	M Z18 NA		•			DRILLING METHOD AN			
WATER L	EVEL: 11.	.94 ft BTO	C (3/30/20	12)	STA	RT: 3/28/2012		END: 3/28/2012		: B.Propst/CLT
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, U MOISTURE (DI CONSISTENCE	DESCRIPTION USCS GROUP SYMBOL COLOR, CONTENT, RELATIVE ENSITY OR DY, SOIL STRUCTURE, NERALOGY		COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
95	RS-8		120	19.8 25.1		SILTY SAND (SM Gray, wet, dense, shell pieces.	I) fine grained, trace can, partially cemented	-		
100_		100.0				-some clay conter				
- - - - -				6.5		Tan, Coarse grair and shell pieces. SILTY SAND (SM	ned, some snd clasts 1) ly cemented sand with	- - - - - - - -		
105 - - - - - -	RS-9		120	14.6		shell fragments. SAND (SP)	I) ise, fine grained, some	- e		
110		110.0				End of Boring Loc	n at 110' has	_		
115						End of Boring Log Abbreviations: bgs - below grour BTOC- below top ft - feet HA - Hand Auger in - inch NM - Not Measur PID - photo ioniza RS - Roto Sonic F	nd surface of casing ed ation detector			- - - - - - - - - - - - - - - - - - -
120 120 										- - - - - -



PROJECT NUMBER: 423783.FI.WI

BORING NUMBER: IR78GW117-UCH

SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 8.17 ft above sea level DRILLING CONTRACTOR: Drill Pro

EAST, NORTH (UT	M Z18 NAI	D83, meter	rs) : 28651	5.24, 383	39648.89 DRILLING METHOD AND	EQUIPMENT	: Roto Sonic SR-2	
WATER LEVEL: 14	.57 ft BTO	C (5/24/20	12)	STA		D: 4/1/2012		B.Propst/CLT
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
- - - - - - - - - - - - - - - - - - -	5.0	60	NM		SILTY SAND (SM) Light brown to tan, loose, fine grained, roots present.	-		
- - - - - RS-1	10.0	60	0		SILTY SAND (SM) Tan/yellow-orange, dry, medium dense to loose, fine grained. -damp @ 9ft.			
15 RS-2	20.0	120	0		-wet @ 10ft. SAND (SP) Tan, wet, loose, fine grained. -color change to very light gray.			
25 RS-3	30.0	120	0.3 0.5 0.2		-medium grained. SILTY SAND (SM) Tan, wet, medium dense, fine grained, trace clay. SAND (SP) Tan, wet, loose, fine grained. SILTY SAND (SM) Tan, medium dense, fine grained, trace clay.			



IR78GW117-UCH

SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR: Drill Pro ELEVATION: 8.17 ft above sea level

DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 EAST, NORTH (UTM Z18 NAD83, meters): 286515.24, 3839648.89

EAST, NORTH (UT			•			IOD AND EQUIPME		
WATER LEVEL: 14	.57 ft BTO	C (5/24/20	12)	STAI	RT: 4/1/2012	END: 4/1/20 ⁻		B.Propst/CLT
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP S' COLOR, MOISTURE CONTENT, REL DENSITY OR CONSISTENCY, SOIL STRUC MINERALOGY	ATIVE	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
35_ RS-4	30.0	120	0		SAND (SP) Light tan, wet, loose, fine grained	d		
45 RS-5	40.0	120	0		-color change to tan/yellow-oran	ge		
50	50.0		0.2		-color change to yellow-orange.			
55 RS-6	60.0	120	9.2		SILTY SAND (SM) Dark gray, wet, medium dense, figrained, trace clayincreasing clay content. CLAYEY SAND (SC) Light gray, stiff, partially cemente with shells. (soil description on next page)	-		



PROJECT NUMBER:

423783.FI.WI

BORING NUMBER:

IR78GW117-UCH

Soil Boring Log

SHEET 3 OF 3

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 8.17 ft above sea level DRILLING CONTRACTOR: Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters): 286515.24, 3839648.89 DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2

WATER LEVEL: 14.57 ft BTOC (5/24/2012)	STA	ART: 4/1/2012 E	ND: 4/1/2012	LOGGER ·	D Dranat/OLT
A C C		1			B.Propst/CLT
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE INTERVAL (ft) (ft) RECOVERY (inches) PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
65		BAND (SP) Brown. End of Boring Log at 60' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run			



IR78GW121-UCH

SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR: Drill Pro ELEVATION: 8.10 ft above sea level

DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 EAST, NORTH (UTM Z18 NAD83, meters) : 285721.53, 3838498.47

WATER LI	-	86 ft BTO		•		RT: 3/30/2012	END: 3/30/	VIENT: Roto Sonic SR-2	B.Propst/CLT	
			3 (17672011	1		SOIL DESCRIPT		COMMENTS	WEI	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, USCS GRO COLOR, MOISTURE CONTENT DENSITY OI CONSISTENCY, SOIL S MINERALOG	, RELATIVE R STRUCTURE,	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	DIAGE	
- - - - - - 5	HA-1	5.0	60	NM		-asphalt. SILTY SAND (SM) Light brown to tan.	-			
- - - - - - 10	RS-1	10.0	36	0		SILTY SAND (SM) Tan/brown/yellow-orange, of fine grainedmoist.	dry, loose,			
- - - - -		10.0		0		SANDY CLAY (CL) Gray, moist, soft, low plasti fine grained sand.	city, 10-15%			
15 -	RS-2		120	0.5		CLAY (CL) Gray, moist, very soft, med trace fine grained sand.	ium plasticity, _ _ _ _ _			
-				4.1 5.4		SANDY CLAY (CL) Gray, moist, very soft, low page 15% fine grained sand. CLAYEY SAND (SC) Dark gray, moist, soft, fine grained.				
20		20.0		0.1						
25		20.0		5.9		SAND (SP) Light gray, loose, fine grain SILTY SAND (SM) Tan/light gray, wet, mediun partially cemented, abunda shell pieces.	n dense,			
30	RS-3	$/$ \setminus	240	0			= = =			



PROJECT NUMBER: 423783.FI.WI

BORING NUMBER: IR78GW121-UCH

SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 8.10 ft above sea level DRILLING CONTRACTOR: Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters); 285721.53, 3838498.47 DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2

EAST, NORTH (UTM Z18 I		•			DRILLING METHOD AND			
WATER LEVEL: 16.86 ft B	FOC (4/5/201	2)	STAF	RT: 3/30/2012		ND: 3/30/2012		B.Propst/CLT
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME	IL DESCRIPTION E, USCS GROUP SYMBOL, COLOR, RE CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE, MINERALOGY		COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
35		0		trace cemente shell fragment	, wet, loose, fine grained, d sand fragments, some			
40 40.0		0.6		SAND (SP) Tan/yellow-ora	inge, wet, loose, fine shell fragments.			
45		0.6						
50 RS-4	240	2.4		SILTY SAND (Yellow-orange partially cemer fragments. SILTY SAND (, wet, medium dense, nted, abundant shell	 - - -		
55		4.2		Gray, wet, med some shells and fragments.	dium dense, fine grained, nd partially cemented sand	d _ d _ - -		
		8.2		and pieces.	nount and size of shells	- - - -		
60_ 60.0		16.8		grainedlimestone pie	, medium dense, fine ces with sand.	- - -		
				(soil description	n on next page)	-		-



PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW121-UCH

IR78GW121-UCH

SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC ELEVATION: 8.10 ft above sea level DRILLING CONTRACTOR: Drill Pro

DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 EAST, NORTH (UTM Z18 NAD83, meters) : 285721.53, 3838498.47

WATER LI	EVEL: 16.	.86 ft BTO	C (4/5/201	2)	STA	RT: 3/30/2012	END: 3	3/30/2012	LOGGER : E	3.Propst/CLT
DEPTH BELOW GROUND SURFACE (ff)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMB COLOR, MOISTURE CONTENT, RELATIV	OL,	DEPTH O	COMMENTS F CASING, DRILLING	WELL DIAGRAM
DEPTH GROUND (f	SAM	INTEI	RECC (inc	PID SCF	GRAPH	DENSITY OR CONSISTENCY, SOIL STRUCTUF MINERALOGY		RATE, DR	RILLING FLUID LOSS, INSTRUMENTATION	
_						End of Boring Log at 60' bgs	-			-
_						Abbreviations:	-			-
_						bgs - below ground surface BTOC- below top of casing	-			_
65_						ft - feet HA - Hand Auger	-			-
						in - inch NM - Not Measured	-			_
-						PID - photo ionization detector RS - Roto Sonic Run	-			
_							-]
_							-]
70_							-			-
-							_			
_							-			
_										
_										
75										
_							_			
_							-			_
-							_			_
_							-			-
80							_			-
_							-			-
_							_			-
-							-			-
-							_			_
85										_
_							-			_
-							-			_
-							-			_
-							_			_
90							_			_
-							-			_
						1				



IR78GW122-UCH

SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC	PROJECT: Site 78 Additional Investigation	LOCATION: Hadnot Point, MBC Camp Lejeune, NC
ELEVATION: 7.98 ft above	sea level	DRILLING CONTRACTOR: Drill Pro

FAST_NORTH (UTM 718 NAD83 meters) : 285729 38 3838510 93 DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2

EAST, NO	•			•	<u> 29.38, 383</u>	38510.93	DRILLING METHOD AND) EQU	JIPMENT: Roto Sc	onic SR-2			
WATER L	EVEL: 16	.76 ft BTO	C (5/25/20	12)	STA	RT: 4/14/2012		ND: 4	1/14/2012		GGER : S.Kli		
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAM MOISTUI CONSIST	DIL DESCRIPTION E, USCS GROUP SYMBOL, COLOR, RE CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE, MINERALOGY		RATE, D	COMMENTS DF CASING, DRILLIN RILLING FLUID LOS INSTRUMENTATIO	S,	WE DIAG	ELL RAM
- - - - - - - 5_	HA-1	5.0	60	NM		-asphalt. SILTY SAND Light brown to	tan.		Lithology from 0-IR78GW121-UCI	40 ft bgs taken fron H	ı		
	NM	5.0	NM	NM		SILTY SAND Tan/brown/yel fine grained. -moist.	(SM) Illow-orange, dry, loose,	-					
10	NM	10.0	NM	NM		CLAY (CL) Gray, moist, v trace fine grai SANDY CLAY Gray, moist, v 15% fine grair CLAYEY SAN	oft, low plasticity, 10-15% and. The rery soft, medium plasticity ned sand. ((CL) ery soft, low plasticity, 10-ned sand.	- 					
25	NM	20.0	NM	NM		SILTY SAND	ose, fine grained. (SM) , wet, medium dense, ented, abundant fossils and						



PROJECT NUMBER: B
423783.FI.WI IR

BORING NUMBER: IR78GW122-UCH

SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 7.98 ft above sea level DRILLING CONTRACTOR: Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters); 285729.38, 3838510.93 DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2

EAST, NO	-			•	9.38, 383	38510.93	DRILLING METHOD AN	ID EQU	JIPMENT : Ro				
WATER LI	EVEL: 16.	.76 ft BTO	C (5/25/20	12)	STA	RT: 4/14/2012		END: 4	/14/2012		LOGGER : S.Ł		
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAMI MOISTUI	DIL DESCRIPTION E, USCS GROUP SYMBO COLOR, RE CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE MINERALOGY		RA ⁻	COMMENTS PTH OF CASING, DRII TE, DRILLING FLUID L TTS, & INSTRUMENTA	.OSS,	WE DIAG	ELL RAM
35						trace cemente shell fragment	e, wet, loose, fine grained sand fragments, some	-					
								= =					
40		40.0		NM 0		Dark gray, we fossilferous lir pieces up to 6 SAND (SP) Yellowish brov grained sand v	wn, wet, low density, fine with silt, shell fragments.	d 7					
50	RS-1		225.6	0.1		Orange-brown sand with foss	ED SAND (SW) n, wet, medium dense, ilferous limestone and id up to 30mm.	-					
- - - -				0.2		(SM/GW) Light to mediu medium dense	WITH GRAVEL Im gray, wet, low to e, fine grained sand with nents and cemented san	d _					
55 <u> </u>				0.5		1.00.0 00							
_				0.1									
-				0.2				-					
60		60.0		0.4 0.2		-color change limestone up -color change		- - - -					
_				0.8		(soil description	on on next page)	-					
			1										



IR78GW122-UCH

SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR: Drill Pro ELEVATION: 7.98 ft above sea level

DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 EAST, NORTH (UTM Z18 NAD83, meters) : 285729.38, 3838510.93

### WATER LEVEL 167 6F BTOC (65/69012) ### START: 411/42012 SOLD DESCRIPTION COUMMENTS WELL DIAGRAM DIAGRA					<u>rs) : 28572</u> 12)				1/14/2012		S Kline/ATI
Abbreviations: bgs. below ground surface BTOC below top of casing It - feet HA - Hand Auger In -	WATER E	LVLL. 10.	7011 1010	3 (3/23/20				IND			
Abbreviations: bgs -below ground surface BTOC- below top of casing It - feet It - fee	-OW 3FA(Ļ	Α. (NIN	90-	SOIL NAME. USCS GROUP SYMBOL.	,			DIAGRAM
Abbreviations: bgs -below ground surface BTOC- below top of casing It - feet It - fee	BEL SUF	PLE PE	E KV	OVE Shes	REE	阜	COLOR, MOISTURE CONTENT RELATIVE		DEPTH OF	CASING, DRILLING	
Abbreviations: bgs -below ground surface BTOC- below top of casing It - feet It - fee	DNU)	SAN	A N	(inc	SCF (p	γAΡ	DENSITY OR		RATE, DRIL	LING FLUID LOSS,	
Abbreviations: bgs. below ground surface BTOC below top of casing It - feet HA - Hand Auger In -	DE JROU		_	Œ.	PID	9	CONSISTENCY, SOIL STRUCTURE,		1 1 1 2 1 3 , & II	15 I RUIVIENTATION	
Abbreviations: bgs. below ground surface git OC, below top of casing 11 - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run 70	<u> </u>						End of Boring Log at 60' bgs				
bgs - below ground surface BTOC: below up of casing It. feet He for the first state of th	_										=
65	-							-			-
65	-						bgs - below ground surface	1			_
70	-						ft - feet	-			-
70	65_						HA - Hand Auger	_			
PID - photo ionization detector RS - Roto Sonic Run 70	_						in - inch NM - Not Measured				
76	-						PID - photo ionization detector	-			=
75	-						RS - Roto Sonic Run				_
75	_							_			=
75	-							_			_
75	_							_			_
75	70 -							-			=
80	_										
80	-							_			-
80											_
80	-							_			-
80	-							-			-
80	_							1			-
80	75 -							-			=
85	_										
85	-							-			-
85											_
85	-							-			=
85								_			=
85	_							_			-
85	80 -							-			=
	-							-			-
											_
	_							-			=
								-			-
] -							-			=
	85							-			-
	_										
	-							-			-
	-										
	-							_			-
	1 -							_			_
] -							-			=
	90 -							-			-
 	_							7			
	-							-			=



IR78GW123-UCH

SHEET 1 OF 3

Soil Boring Log

	CLIENT: NAVFAC	PROJECT:	Site 78 Additional Investigation	LOCATION: Hadnot Point, MBC Camp Lejeune, NC
--	----------------	----------	----------------------------------	--

ELEVATION: 7.98 ft above sea level DRILLING CONTRACTOR: Drill Pro

DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 EAST, NORTH (UTM Z18 NAD83, meters): 285736.10, 3838508.95

EAST, NORTH (UTM Z1)	8 NAD83, mete	ers): 28573			EQUIPMENT: ROT		
WATER LEVEL: 16.7 ft B	TOC (5/25/201	2)	STA		D: 4/13/2012	LOGGER:	S.Kline/ATL
DEPTH BELOW GROUND SURFACE (ff) SAMPLE TYPE INTERVAL	(ft) RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	RAT	COMMENTS TH OF CASING, DRILLING E, DRILLING FLUID LOSS, TS, & INSTRUMENTATION	WELL DIAGRAM
HA-1	60	NM		-asphalt. SILTY SAND (SM) Light brown to tan.	Lithology fror IR78GW121-	n 0-40 ft bgs taken from -UCH	
NM 10 10	NM	NM		SILTY SAND (SM) Tan/brown/yellow-orange, dry, loose, fine grainedmoist.			
10.	0 NM	NM		SANDY CLAY (CL) Gray, moist, soft, low plasticity, 10-15% fine grained sand. CLAY (CL) Gray, moist, very soft, medium plasticity, trace fine grained sand.			
20 20.				SANDY CLAY (CL) Gray, moist, very soft, low plasticity, 10- 15% fine grained sand. CLAYEY SAND (SC) Dark gray, moist, soft, fine to medium grained.			
20.	0			SAND (SP) Light gray, loose, fine grained. SILTY SAND (SM) Tan/light gray, wet, medium dense, partially cemented, abundant fossils and shell pieces.			
30 NM	NM	NM			-		



PROJECT NUMBER: 423783.FI.WI BORING NUMBER:

IR78GW123-UCH SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 7.98 ft above sea level DRILLING CONTRACTOR: Drill Pro

EAST, NO	ORTH (UT	M Z18 NA	D83, mete	rs) : 28573	6.10, 383	B8508.95 DRILLING ME	THOD AND EQUIPME	ENT: Roto Sonic SR-2		
WATER LEVEL: 16.7 ft BTOC (5/25/2012) START: 4/13/2					STA		END: 4/13/2		LOGGER : S.F	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTIOI SOIL NAME, USCS GROUF COLOR, MOISTURE CONTENT, R DENSITY OR CONSISTENCY, SOIL STR MINERALOGY	P SYMBOL, ELATIVE	COMMEN DEPTH OF CASING RATE, DRILLING FL TESTS, & INSTRUM	, DRILLING UID LOSS,	WELL DIAGRAM
35_						SILTY SAND (SM) Yellow-orange, wet, loose, fine trace cemented sand fragmen shell fragments.	e grained, - tts, some - - - -			
- - - - - - 40		40.0				-tan, increased cemented san fragments.	d - - - - - - -			
-		40.0				WELL GRADED SAND (SW) Dark gray, wet, loose, fossilfe	rous			
-				0		limestone fragments. SAND (SP) Yellowish brown, wet, low den grained sand with silt, shell fra	isity, fine			
45 - - -							-			
- - - 50	RS-1		238.8	0		WELL GRADED SAND (SW) Orange-brown, wet, medium of coarse grained, fossilferous lin and cemented sand fragments 40mm.	mestone			
- - - -	, NO-1		230.0	0.3		SILTY SAND WITH GRAVEL (SM/GW) Gray, wet, low density to loose grained sand with silt, shell fra and cemented sand fragments 30mm.	agments 7			
55 - - - -				0.2						
60		60.0		1		-color change to light gray.	-			
						(soil description on next page)	' 			



PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW123-UCH

Soil Boring Log

SHEET 3 OF 3

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 7.98 ft above sea level DRILLING CONTRACTOR: Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters): 285736.10, 3838508.95 DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2

### START -4192012 START -4192012 SND -4192012 LOGGER : SIGNAPATH **SIGNAPATH STORT OF THE PROOF OF THE PROO	EAST, NO	-			•							
Abbreviation: Book Common Common	WATER LE	VEL: 16.	7 ft BTOC	(5/25/201		STAI		END: 4	/13/2012		OGGER : S.Ł	
Abbreviation: Book Common Common	DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME, USCS GROUP SYMBO COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURI MINERALOGY	≣	RA	PTH OF CASING, DRILL TE, DRILLING FLUID LC	OSS.	WELL DIAGRAM
bgs - below ground surface BTOC- below top of casing R - feet H -							End of Boring Log at 60' bgs					_
90	65				QIA .	GR	CONSISTENCY, SOIL STRUCTUR MINERALOGY End of Boring Log at 60' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization detector	E,	TES	STS, & INSTRUMENTAT	ION	
']	90							\dashv				-
								- 1				=



IR78GW124-UCH

SHEET 1 OF 3

Soil Boring Log

CLIENT: NAVFAC	PROJECT: Site 78 Additional Investigation	LOCATION: Hadnot Point, MBC Camp Lejeune, NC
ELEVATION: 7.97 ft above	e sea level	DRILLING CONTRACTOR: Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters): 285739.74, 3838510.02 DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 WATER LEVEL: 16.78 ft BTOC (5/25/2012) END: 4/14/2012 LOGGER : K.Schrecengost/BOS START: 4/14/2012 DEPTH BELOW GROUND SURFACE SOIL DESCRIPTION COMMENTS WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM INTERVAL (ft) RECOVERY SAMPLE TYPE (inches) COLOR, (mdd) GRAPHIC DEPTH OF CASING, DRILLING £ MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINÉRALOGY -asphalt. 0.0 SILTY SAND (SM) Light brown to tan. HA-1 60 NM Lithology from 0-40 ft bgs taken from IR78GW121-UCH 5.0 SILTY SAND (SM) Tan/brown/yellow-orange, dry, loose, fine grained. NM NM NM -moist. 10 10.0 10.0 SANDY CLAY (CL) Gray, moist, soft, low plasticity, 10-15% fine grained sand. CLAY (CL) Gray, moist, very soft, medium plasticity, trace fine grained sand. 15 NM NM NM SANDY CLAY (CL)
Gray, moist, very soft, low plasticity, 1015% fine grained sand. CLAYEY SAND (SC) Dark gray, moist, soft, fine to medium 20 20.0 20.0 SAND (SP) Light gray, loose, fine grained. SILTY SAND (SM) Tan/light gray, wet, medium dense, partially cemented, abundant fossils and shell pieces. 25 30 NM



PROJECT NUMBER: 423783.FI.WI

BORING NUMBER: IR78GW124-UCH

SHEET 2 OF 3

Soil Boring Log

CLIENT: NAVFAC	PROJECT: Site 78 Additional Investigation	LOCATION : Hadnot Point, MBC Camp Lejeune, NC	
FLEVATION : 7 97 ft above	sea level	DRILLING CONTRACTOR : Drill Pro	

DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 EAST, NORTH (UTM Z18 NAD83, meters) : 285739.74, 3838510.02 WATER LEVEL: 16.78 ft BTOC (5/25/2012) END: 4/14/2012 LOGGER: K.Schrecengost/BOS START: 4/14/2012 DEPTH BELOW SROUND SURFACE COMMENTS SOIL DESCRIPTION WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM INTERVAL (ft) RECOVERY (inches) SAMPLE TYPE COLOR, (mdd) GRAPHIC DEPTH OF CASING, DRILLING £ MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINÉRALOGY SILTY SAND (SM) Yellow-orange, wet, loose, fine grained, trace cemented sand fragments, some shell fragments. 35 -tan, increased cemented sand fragments. 40 40.0 40.0 SAND (SP) Orange-tan, moist, medium dense, fine to very fine grained, shell fragments, increasing grain size of shell fragments. RS-1 0 54 45.0 45 45.0 -color change to tan-light brown. RS-2 50.4 0 WELL GRADED SAND (SW) Orange, moist, loose, medium to very fine grained, partially cemented, 1.5-inch cemented clasts and shell fragments. 50 50.0 SILTY SAND (SM) 0.2 50.0 Light gray, moist, medium dense, fine to very fine grained, lightly cemented, trace shell fragments, silt content increasing with depth, increasing cementation and 0 shell fragments with depth. RS-3 51.6 0.3 -color change to gray, increasing 55 55.0 cementation and shell clasts (~2inches). 1.9 55.0 -color change to light gray, increasing RS-4 56.4 0.7 cementation and shell clasts (~3-60.0 60 -color change to gray, decreasing cementation and shell clasts (~0.5-0.2 inches).



PROJECT NUMBER:	BORING NUMBER:
423783.FI.WI	IR78GW124-UCH

IR78GW124-UCH

SHEET 3 OF 3

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC ELEVATION: 7.97 ft above sea level DRILLING CONTRACTOR: Drill Pro

DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 EAST, NORTH (UTM Z18 NAD83, meters) : 285739.74, 3838510.02 WATER LEVEL: 16.78 ft BTOC (5/25/2012) START: 4/14/2012 LOGGER: K.Schrecengost/BOS END: 4/14/2012 DEPTH BELOW GROUND SURFACE (ft) SOIL DESCRIPTION COMMENTS PID SCREENING (ppm) WELL SOIL NAME, USCS GROUP SYMBOL, RECOVERY (inches) DIAGRAM INTERVAL (ft) SAMPLE TYPE COLOR, GRAPHIC DEPTH OF CASING, DRILLING MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY End of Boring Log at 60' bgs Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger 65 in - inch NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run 70 75 80 85 90



PROJECT NUMBER: 423783.FI.WI

BORING NUMBER:

IR78GW125-MCH

SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC	PROJECT:	Site 78 Additional Investigation	LOCATION: Hadnot Point, MBC Camp Lejeune, NC
,			

ELEVATION : 8.41 ft above sea level DRILLING CONTRACTOR : Drill Pro

ELOW	<u> </u>	/AL	ERY	ENING (r	5010	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR,	COMMENTS	WELL DIAGRA	- AM
DEPTH BELOW GROUND SURFACE	SAMPLE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY	DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION]
5	- - - - - - - - - - - - - - - - - - -	5.0	60	NM		SILTY SAND (SM) Dark gray, dry, loose.	Lithology from 0-70 ft bgs taken from IR78GW116-MCH		
10	- - - - RS-1	5.0	60	NM		SANDY SILT (ML) Dark gray/tan, dry, loose, fine grained, organic, trace roots. SILTY SAND (SM) Tan/yellow-orange, dry, loose, fine			
	- - -	10.0				grained. SAND (SP) Tan, moist, loose, fine grained.			
15	NM		NM	NM		SILTY SAND (SM) Yellow-orange, moist, loose, fine grained.			
	- - - - -				<i>777777</i>	SAND (SP) Tan, moist/wet, loose, fine grainedcolor change to light gray.			
20	- - - - -	20.0				Light gray, damp, stiff, fine grained sand, low plasticity. SANDY SILTY CLAY (CL) Light gray, moist, soft, fine grained.			
25	- - - - - -					SILTY SAND (SM) Tan, wet, loose, fine grained. SAND (SP) Light tan, wet, loose, fine grained.			
30	- - - - - -					-sandy clay lens @ 27ft.			
	NM		NM	NM	<u> </u>	_	1		X/X



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI

IR78GW125-MCH

SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PRO	J.FCT Site 78 Additional Investigation	LOCATION: Hadnot Point, MBC Camp Lejeune, NC	

ELEVATION: 8.41 ft above sea level DRILLING CONTRACTOR: Drill Pro

FAST_NORTH (UTM 718 NAD83 meters) : 286427 70 3839627 49 DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2

	•			rs): 28642			THOD AND EQUIPMEN		
WATER LE	EVEL: 15.	.59 ft BTO	C (5/25/20	12)	STAI	RT: 4/10/2012	END: 4/10/20		: S.Kline/ATL
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP COLOR, MOISTURE CONTENT, RE DENSITY OR CONSISTENCY, SOIL STR MINERALOGY	SYMBOL, ELATIVE	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
35		40.0				SAND (SP) Light tan, wet, loose, fine grain	ned		
45	NM	40.0	NM	NM		SILTY SAND (SM) Tan/yellow-orange, wet, loose, grained. SAND (SP) Yellow-orange, wet, loose, fine SILTY SAND (SM) Yellow-orange, fine grained.	-		
60		60.0				SANDY SILT (ML) Tan, dry, dense, fine grainedcolor change to dark gray. SILTY SAND (SM) Tan/yellow-orange/gray, damp fine grained. (soil description on next page)	\neg		



BORING NUMBER: IR78GW125-MCH

SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 8.41 ft above sea level DRILLING CONTRACTOR: Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters): 286427.70, 3839627.49 DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2

EAST, NORTH (UTM		•					MENT : Roto Sonic SR-2	
WATER LEVEL: 15.59	9 ft BTOC (5.	5/25/2012) I	1	STAF		END: 4/10		S.Kline/ATL
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE	INTERVAL (ft)	(inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
65_ NM	70.0		NM		SAND (SP) Tan, wet, loose, fine grained.			
	70.0		0.8		SAND (SP) Grayish brown, wet, medium dense, ver fine grained, sand with some silt.	y _ - - - - -		
75 <u></u>			0.3		SILTY SAND (SM) Gray/reddish brown, wet, medium dense, very fine grained, sand with some silt and shell fragments and grave to 20mmcolor change to medium gray.	- el - -		
80_ RS-1	21		2.3					
			1.3					
85 			0.9			-		
90	90.0		1.8		-color change to dark gray, damp.	-		
_			2.3		(soil description on next page)	-		-



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI

IR78GW125-MCH

SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR: Drill Pro ELEVATION: 8.41 ft above sea level

DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 EAST, NORTH (UTM Z18 NAD83, meters): 286427.70, 3839627.49

EAST, NO								ENT: Roto Sonic SR-2	
WATER L	EVEL: 15.	.59 ft BTO	C (5/25/20	12)	STA		ND: 4/10/2		
DEPTH BELOW GROUND SURFACE (ff)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
						End of Boring Log at 90' bgs			
-						Abbreviations:	1		-
95						bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch	- - - - -		- - - -
-						NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run			- - -
400							-		-
100							=		
_]		-
-							-		-
_							=		- -
105							4		
_									-
-							-		-
-							1		-
110 <u> </u>							-		
-							-		-
-							-		-
-							-		-
115 -							-		_
-							=		-
-							=		-
-							=		- -
120							4		-
							-		



BORING NUMBER:

IR78GW126-MCH s

SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC	PROJECT:	Site 78 Additional Investigation	LOCATION: Hadnot Point, MBC Camp Lejeune, NC	
ELEVATION: 8.26 ft above	e sea level		DRILLING CONTRACTOR: Drill Pro	

EAST, NORTH (UTM Z18 NAD83, meters) : 286434.48, 3839631.45 DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 WATER LEVEL: 15.71 ft BTOC (5/25/2012) END: 4/4/2012 LOGGER: B.Propst/CLT START: 4/4/2012 DEPTH BELOW GROUND SURFACE SOIL DESCRIPTION COMMENTS WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM INTERVAL (ft) RECOVERY SAMPLE TYPE (inches) COLOR, (mdd) GRAPHIC DEPTH OF CASING, DRILLING £ MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINÉRALOGY SILTY SAND (SM) 0.0 Dark gray, dry, loose. HA-1 60 NM Lithology from 0-70 ft bgs taken from IR78GW116-MCH 5.0 SANDY SILT (ML) 5.0 Dark gray/tan, dry, loose, fine grained, organic, trace roots. RS-1 60 NM SILTY SAND (SM) 10 10.0 Tan/yellow-orange, dry, loose, fine grained. SAND (SP)
Tan, moist, loose, fine grained. SILTY SAND (SM) Yellow-orange, moist, loose, fine grained. 15 NM NM NM SAND (SP)
Tan, moist/wet, loose, fine grained. -color change to light gray. SANDY CLAY (CL) Light gray, damp, stiff, fine grained 20 20.0 sand, low plasticity. 20.0 SANDY SILTY CLAY (CL) Light gray, moist, soft, fine grained. SILTY SAND (SM) Tan, wet, loose, fine grained. 25 SAND (SP) Light tan, wet, loose, fine grained. -sandy clay lens @ 27ft. 30 NM NM



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI

IR78GW126-MCH

SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC	PROJECT: Site 78 Additional Investigation	LOCATION: Hadnot Point, MBC Camp Lejeune, NC	
FLEVATION: 8.26 ft above	sea level	DRILLING CONTRACTOR: Drill Pro	

DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 EAST, NORTH (UTM Z18 NAD83, meters) : 286434.48, 3839631.45 WATER LEVEL: 15.71 ft BTOC (5/25/2012) END: 4/4/2012 LOGGER: B.Propst/CLT START: 4/4/2012 DEPTH BELOW
GROUND SURFACE
(ft) SOIL DESCRIPTION COMMENTS PID SCREENING (ppm) WELL SOIL NAME, USCS GROUP SYMBOL, COLOR, RECOVERY (inches) DIAGRAM INTERVAL (ft) SAMPLE TYPE GRAPHIC DEPTH OF CASING, DRILLING MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY SAND (SP) Light tan, wet, loose, fine grained. 35 40 40.0 40.0 45 SILTY SAND (SM)
Tan/yellow-orange, wet, loose, fine grained. 50 NM NM NM SAND (SP) Yellow-orange, wet, loose, fine grained. SILTY SAND (SM) Yellow-orange, fine grained. 55 SANDY SILT (ML)
Tan, dry, dense, fine grained. -color change to dark gray. SILTY SAND (SM)
Tan/yellow-orange/gray, damp, loose, 60 60.0 fine grained. 60.0 (soil description on next page)



BORING NUMBER: IR78GW126-MCH

SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 8.26 ft above sea level DRILLING CONTRACTOR: Drill Pro

EAST, NORTH (UTM Z18 NA	D83, mete	rs): 28643	34.48, 383	39631.45 DRILLING METHOD AN	D EQUIPMEN	NT: Roto Sonic SR-2		
WATER LEVEL: 15.71 ft BTO	C (5/25/20	12)	STA		END: 4/4/201			
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM	
65 NM	NM	NM		SAND (SP) Tan, wet, loose, fine grained.				
RS-1	60	0.7		SAND (SP) Tan, wet, loose, medium grained. SILTY SAND (SM) Tan, wet, loose, fine grained.	-			
75.0 75.0 75.0 75.0 80.0	60	2.2		-trace shell fragments. -color change to gray, medium dense, trace shell fragments.	-			
RS-3 85.0	60	4.2 6.7			-			
RS-4 90	60	9.5		-color change to dark gray.	-			
			1 1 1 1 1 1 1 1 1 1 1	(soil description on next page)	-			



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI

IR78GW126-MCH

SHEET 4 OF 4

Soil Boring Log

CLIENT, NAVEAC	DDO IFOT	Cita 70 Additional Investigation	LOCATION - Hadnet Daint MDC Comp Leigung MC
CLIENT: NAVFAC	PROJECT:	Site 78 Additional Investigation	LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 8.26 ft above sea level DRILLING CONTRACTOR: Drill Pro

DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 EAST, NORTH (UTM Z18 NAD83, meters): 286434.48, 3839631.45

EAST, NO									
WATER LI	EVEL: 15.	.71 ft BTO	C (5/25/20	12)	STA		ND: 4/4/2012		B.Propst/CLT
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
_						End of Boring Log at 90' bgs	_		_
-						Abbreviations:	=		-
95 -						bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch			- - -
- - -						NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run			-
_]		=
100							_		
-							-		-
-]		=
-									-
105_							_		-
-							1		-
_]		- -
-							-		-
110							1		-
-]		
-							-		-
-							-		-
]		-
115 <u> </u>							-		
-							1		- -
-]		-
-							-		- -
120_							4		-
-							1		-



BORING NUMBER: IR78GW127-MCH

SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 8.29 ft above sea level DRILLING CONTRACTOR: Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters): 286436.81, 3839631.96 DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2

WATER I	F\/FI · 15	.71 ft BTO	C (5/25/20	12)	SΤΔ	RT: 4/3/2012 E	ND: 4	/3/2012 LOGGER : E	B.Propst/CLT	
			3 (3/23/20	1	1	SOIL DESCRIPTION	-ND. 4/	COMMENTS	WELI	
DEPTH BELOW GROUND SURFACE (ft)		<u> </u>	₹ (PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME. USCS GROUP SYMBOL.		COMMENTO	DIAGR	
H BEL	SAMPLE TYPE	ER (*)	OVE	CREEN (ppm)	呈	COLOR, MOISTURE CONTENT, RELATIVE		DEPTH OF CASING, DRILLING		
THE ONL	SAN	INTERVAL (ft)	RECOVERY (inches)	OS C	RAP	DENSITY OR		RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION		
GRO			_	瞐	o o	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		resto, a mornomentation		
_		0.0				SILTY SAND (SM)	-			7 🕌
-		$ \setminus / $				Dark gray, dry, loose.	- 1			
_		$ \setminus / \mid$					4			
-	HA-1	X	60	NM			-	Lithology from 0-70 ft bgs taken from		
		$ \ / \ $					1	IR78GW116-MCH		
-		/ \					-			
5_		5.0				CANDY OU T (ML)				
-	_	5.0				SANDY SILT (ML) Dark gray/tan, dry, loose, fine grained,	-			
_						organic, trace roots.	1			
-	-						- 1			
-	NM		NM	NM			1			
-							-			
						SILTY SAND (SM)				
10		10.0 10.0				Tan/yellow-orange, dry, loose, fine grained.	-			
_		10.0								
-						SAND (SP) Tan, moist, loose, fine grained.	-			
_						Tan, molet, 1888, into grained.				
-						SILTY SAND (SM)				
						Yellow-orange, moist, loose, fine				
15	_					grained.				
"-	NM		NM	NM			\exists			
-						SAND (SP)				
_						Tan, moist/wet, loose, fine grained.				
-	_					-color change to light gray.				
_										
_	-				777777	SANDY CLAY (CL)				
20		20.0				Light gray, damp, stiff, fine grained	」			
-		20.0				sand, low plasticity. SANDY SILTY CLAY (CL)	_4			
-	1				V////	Light gray, moist, soft, fine grained.				
-	-				<i>\\\\\\</i>	-	4			
-	1									
] -	-					SILTY SAND (SM) Tan, wet, loose, fine grained.				
-	1					i an, wet, 1005e, inte granteu.	\dashv			
25					ШШ	CAND (CD)				
-	1					SAND (SP) Light tan, wet, loose, fine grained.	-			
_]						1			
-	1					-sandy clay lens @ 27ft.				
-]						1			
-	1						-			
-	1									
30	NM		NM	NM						



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI

IR78GW127-MCH

SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC	PROJECT: Site 78 Additional Investigation	LOCATION: Hadnot Point, MBC Camp Lejeune, NC	
ELE (ATION 0.00 %)		DRILLING CONTRACTOR R III R	
FLEVATION : 8 29 ft above	sea level	DRILLING CONTRACTOR: Drill Pro	

DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 EAST, NORTH (UTM Z18 NAD83, meters): 286436.81, 3839631.96 WATER LEVEL: 15.71 ft BTOC (5/25/2012) END: 4/3/2012 LOGGER: B.Propst/CLT START: 4/3/2012 DEPTH BELOW
GROUND SURFACE
(ft) SOIL DESCRIPTION COMMENTS PID SCREENING (ppm) WELL SOIL NAME, USCS GROUP SYMBOL, COLOR, RECOVERY (inches) DIAGRAM INTERVAL (ft) SAMPLE TYPE GRAPHIC DEPTH OF CASING, DRILLING MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINÉRALOGY SAND (SP) Light tan, wet, loose, fine grained. 35 40 40.0 40.0 45 SILTY SAND (SM)
Tan/yellow-orange, wet, loose, fine grained. 50 NM NM NM SAND (SP) Yellow-orange, wet, loose, fine grained. SILTY SAND (SM) Yellow-orange, fine grained. 55 SANDY SILT (ML)
Tan, dry, dense, fine grained. -color change to dark gray. SILTY SAND (SM)
Tan/yellow-orange/gray, damp, loose, 60 60.0 fine grained. 60.0 (soil description on next page)



BORING NUMBER:

IR78GW127-MCH

SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC	PROJECT: Site 78 Additional Investigation	LOCATION: Hadnot Point, MBC Camp Lejeune, NC	
ELEVATION : 9 20 ft about	a and level	DRILLING CONTRACTOR : Drill Dro	

DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 EAST, NORTH (UTM Z18 NAD83, meters): 286436.81, 3839631.96 WATER LEVEL: 15.71 ft BTOC (5/25/2012) LOGGER: B.Propst/CLT START: 4/3/2012 END: 4/3/2012 DEPTH BELOW
GROUND SURFACE
(ft) SOIL DESCRIPTION COMMENTS PID SCREENING (ppm) WELL SOIL NAME, USCS GROUP SYMBOL, RECOVERY (inches) DIAGRAM INTERVAL (ft) SAMPLE TYPE COLOR, GRAPHIC DEPTH OF CASING, DRILLING MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINÉRALOGY SAND (SP)
Tan, wet, loose, fine grained. 65 NM NM NM 70 70.0 SAND (SP) 70.0 Tan, wet, medium dense, fine grained, 2.2 trace shell fragments. RS-1 60 SILTY SAND (SM) 2.5 Tan, wet, medium dense, fine grained, 75 75.0 trace shell fragments. 75.0 4.8 -color change to gray. RS-2 60 6.2 80 80.0 80.0 12.1 SAND (SP)
Gray, wet, loose to medium dense, fine grained, trace shell fragments. RS-3 60 7.1 85 85.0 85.0 6.7 RS-4 60 20.1 90 90.0 (soil description on next page)



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI

IR78GW127-MCH

SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR: Drill Pro ELEVATION: 8.29 ft above sea level

DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 EAST, NORTH (UTM Z18 NAD83, meters): 286436.81, 3839631.96

EAST, NOR	-			•					
WATER LEV	VEL: 15.	71 ft BTO	C (5/25/20	12)	STA		ND: 4/3/2012		3.Propst/CLT
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL, COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
_						End of Boring Log at 90' bgs			_
						Abbreviations:	1		-
95						bgs - below ground surface BTOC- below top of casing ft - feet			-
-						HA - Hand Auger in - inch			-
						NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run	-		-
									- - -
100							-		-
]		<u> </u>
							-		-
105_									- -
							-		-
							-		-
							-		-
110							-		_
							-		-
							-		-
115							-		-
							}		- - -
							-		- - -
120]		_



BORING NUMBER:

IR78GW128-MCH

SHEET 1 OF 4

Soil Boring Log

CLIENT: NAVFAC	PROJECT: Site 78 Additional Investigation	LOCATION : Hadnot Point, MBC Camp Lejeune, NC	
ELEVATION : 8 10 ft above	e sea level	DRILLING CONTRACTOR : Drill Pro	

DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2 EAST, NORTH (UTM Z18 NAD83, meters) : 285722.48, 3838497.25 WATER LEVEL: 17.03 ft BTOC (5/25/2012) END: 4/19/2012 LOGGER: S.Kline/ATL START: 4/19/2012 DEPTH BELOW GROUND SURFACE COMMENTS SOIL DESCRIPTION WELL PID SCREENING SOIL NAME, USCS GROUP SYMBOL, DIAGRAM INTERVAL (ft) RECOVERY SAMPLE TYPE (inches) COLOR, (mdd) GRAPHIC DEPTH OF CASING, DRILLING £ MOISTURE CONTENT, RELATIVE RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINÉRALOGY -asphalt. 0.0 SAND (SP) Light brown, dry to moist, loose, fine HA-1 60 NM Lithology from 0-90 ft bgs taken from IR78GW129-LCH -color change to light gray. 5.0 CLAY (CL) Dark gray. No Recovery. SILTY SAND (SM) NM NM NM Light gray mottled with dark orange, moist, loose, fine grained, poorly graded 10 10.0 10.0 -wet, some clay presnet. SANDY CLAY (CL) Gray, moist, soft, low plasticity, cohesive, sticky, 5-10% silt. 15 NM NM NM 20 20.0 20.0 **CLAYEY SAND (SC)** Gray, moist, loose, low plasticity, cohesive, sticky, 50% sand. SILTY SAND (SM) Light orange mottled with light gray, wet, medium dense, fine grained sand, partially to weakly cemented with shells. 25 NM NM NM 30 30.0 (soil description on next page)



BORING NUMBER:

IR78GW128-MCH SHEET 2 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR: Drill Pro ELEVATION: 8.10 ft above sea level

LACT, NOIN	IH (UII	<u>M Z18 NAI</u>	D83, mete	rs): 28572	2.48, 383	38497.25	DRILLING METHOD AN	ID EQL	JIPMENT: Roto Sonic SR-2	Roto Sonic SR-2		
WATER LEV	'EL: 17.0	03 ft BTO	C (5/25/20	12)	STA	RT: 4/19/2012		END: 4	1/19/2012		S.Kline/ATL	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME MOISTUF CONSISTE	IIL DESCRIPTION E, USCS GROUP SYMBOI COLOR, RE CONTENT, RELATIVE DENSITY OR ENCY, SOIL STRUCTURE MINERALOGY		COMMEN DEPTH OF CASING RATE, DRILLING FL TESTS, & INSTRUM	, DRILLING UID LOSS,	WE DIAG	ELL BRAM
- - - - - - - 35	NM	30.0	NM	NM		nodules of ce SILTY SAND (Light orange m medium dense	ted with cobble sized mented sand and shells. SM) nottled with light gray, we also from the sand, akly cemented with shells	t, -				
45_	NM	40.0	NM	NM		medium dense shells, trace no shells, trace no shells.	wet, dense, fine grained.					
55_	NM	50.0	NM	NM		highly cemente 2cm. -color change lithified.	ed, abundant shells up to					
1 7		60.0				No Recovery.		-				



BORING NUMBER: IR78GW128-MCH

SHEET 3 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 8.10 ft above sea level DRILLING CONTRACTOR: Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters): 285722.48, 3838497.25 DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2

				rs): 28572				MENT: Roto Sonic SR-2	
WATER LE	=VEL: 17	.03 ft BTO	C (5/25/20	1	STA I		END: 4/19		
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOI COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE MINERALOGY		COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
_						No Recovery.	-		
65 - - - - - - - -	NM		NM	NM		SAND (SP) Gray, moist, loose, fine grained, trace shell fragments.			
70		70.0					4		
75	NM	80.0	NM	NM		-wet.			
-		80.0				SILTY SAND (SM) Gray, wet, medium dense, poorly			
85	NM		NM	NM		graded, cohesive, 15-20% silt, trace shell fragments.			
						-color change to light gray, gravel sized cemented sand nodules and shells.	' ქ		
90		90.0		0		(soil description on next page)			



BORING NUMBER: IR78GW128-MCH

SHEET 4 OF 4

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 8.10 ft above sea level DRILLING CONTRACTOR: Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters): 285722.48, 3838497.25 DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2

EAST, NO				•				ENT: Roto Sonic SR-2	
WATER L	EVEL: 17.	03 ft BTO	C (5/25/20	12)	STA	RT: 4/19/2012	END: 4/19/2		S.Kline/ATL
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP COLOR, MOISTURE CONTENT, RI DENSITY OR CONSISTENCY, SOIL STR MINERALOGY	SYMBOL, ELATIVE	COMMENTS DEPTH OF CASING, DRILLING RATE, DRILLING FLUID LOSS, TESTS, & INSTRUMENTATION	WELL DIAGRAM
95	RS-1		174	0 0		SILTY SAND (SM) Dark gray, moist, medium den grained sand with silt, gravel a up to 30mm. WELL GRADED SAND WITH GRAVEL (SW/GW) Light gray, wet. SILTY SAND (SM) Medium gray, moist, medium or grained sand with silt, gravel a up to 30mm. SAND (SP) Medium gray, moist, low dens grained sand with silt, shell fra present.	dense, fine ind clasts		
100				0		-decreasing silt content.	-		
105_		105.0		0		End of Boring Log at 105' bgs			
-				U			1		-
110 						Abbreviations: bgs - below ground surface BTOC- below top of casing ft - feet HA - Hand Auger in - inch NM - Not Measured PID - photo ionization detector RS - Roto Sonic Run			- - - - - - - - - -
115 - - - 115 - - - -							- - - - - - - - - - - - - - - - - - -		- - - - - - - -
120 - - 120 - -							- - - - - - - -		- - - - - - -



BORING NUMBER:

IR78GW129-LCH SHEET 1 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR: Drill Pro ELEVATION: 8.19 ft above sea level

EAST, NORTH (UT	M Z18 NA	<u>083, meter</u>	rs): 28571	19.29, 383	38498.63	DRILLING METHOD AN) EQL	JIPMENT: Roto Sonic	SR-2, 6" casing		
WATER LEVEL: 15	.4 ft BTOC	(5/25/201	2)	STA	RT: 11/12/2012		ND: 1	11/12/2012		: A.Guilfoyle/C	LT
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME MOISTUR CONSISTE	L DESCRIPTION , USCS GROUP SYMBOL COLOR, E CONTENT, RELATIVE DENSITY OR NCY, SOIL STRUCTURE, MINERALOGY	1	DEPTH OF (RATE, DRIL	CASING, DRILLING LING FLUID LOSS, ISTRUMENTATION	WE DIAG	ELL RAM
- - - - - - - - - - - - - - - - - - -	5.0	60	NM	,,,,,,	-asphalt. SAND (SP) Light brown, dry grained. -color change to	y to moist, loose, fine o light gray.					
- - - - - RS-1	10.0	36	0.4		Dark gray. No Recovery. SILTY SAND (S. Light gray mottl moist, loose, fir sand.	led with dark orange, ne grained, poorly graded	/				
15RS-2	20.0	120	0.9		cohesive, stick	(CL) ft, low plasticity, y, 5-10% silt.					
25	20.0	102	1.2 2.4 1.5		cohesive, sticky SILTY SAND (S Light orange m medium dense	ose, low plasticity, y, 50% sand.					



BORING NUMBER: IR78GW129-LCH

SHEET 2 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 8.19 ft above sea level DRILLING CONTRACTOR: Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters): 285719.29, 3838498.63 DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2, 6" casing

EAST, NORTH (UT			•						A Cuilfordo/CLT
WATER LEVEL: 15	.4 π ΒΤΟC	(5/25/201/		SIA	RT: 11/12/2012 SOIL DESCRIPTION	END:	11/12/2012	COMMENTS	A.Guilfoyle/CLT
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMB COLOR, MOISTURE CONTENT, RELATIV DENSITY OR CONSISTENCY, SOIL STRUCTUR	Έ	RATE, DI	OF CASING, DRILLING RILLING FLUID LOSS, & INSTRUMENTATION	WELL DIAGRAM
G R D	\ 20.0		ш.	THE THE	MINERALOGY -highly cemented with cobble sized				N/A N/A
-	30.0		1.5		nodules of cemented sand and shel SILTY SAND (SM) Light orange mottled with light gray, medium dense, fine grained sand, partially to weakly cemented sand wi shells.	wet,			
35 RS-4		90	1.1			 - - -			
40	40.0		5.5 6.4		No Recovery.	- - -			
-	40.0		7.8		SAND (SP) Light orange mottled with light gray,	- - - -			
45_ RS-5		96	12		medium dense, fine grained, abunda shells, trace nodules of cemented sa	nt [–]			
			10.1			- - - -			
	\				SILTY SAND (SM)		-		
50	50.0		11.5		Dark orange, wet, dense, fine graine highly cemented, abundant shells up 2cmcolor change to gray, almost fully lithified.	d, to -			
-			2.7			- - - -			
55 RS-6 		120	4.3			- - - -			
60	60.0		1.1			- - - -			
	60.0		0.9		No Recovery.				



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI IR78GW129-LCH

Soil Boring Log

SHEET 3 OF 6

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 8.19 ft above sea level DRILLING CONTRACTOR: Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters): 285719.29, 3838498.63 DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2, 6" casing

EAST, NO	-			•				JIPMENT: Roto Sonic S			
WATER LE	EVEL: 15.	.4 ft BTOC	(5/25/201	2)	STA		END: 1	11/12/2012		A.Guilfoyle/CL	
DEPTH BELOW GROUND SURFACE (ft)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		DEPTH OF CA RATE, DRILLI	MMENTS ASING, DRILLING NG FLUID LOSS, TRUMENTATION	WEL DIAGR	L RAM
_						No Recovery.	-				
- - -				1.1		SAND (SP) Gray, moist, loose, fine grained, trace shell fragments.	- - -				
65 _ _ _	RS-7		96	0			- - -				
- - - -				0			- - - -				
70		70.0 \ \ 70.0 \		0		· · -wet.	_				
- - -		76.0				-wet.	- - -				
- - 75				64.6			- - -				
- - -	RS-8	\bigwedge	120	85.7			-				
- - -				73.8			- - -				
80		80.0		10.1			_				
- - -		80.0		18.1			-	8-in temporary casing	installed to 50 ft bgs		
- - -				44		SILTY SAND (SM) Gray, wet, medium dense, poorly graded, cohesive, 15-20% silt, trace shell fragments.	- - -				
85 - - -	RS-9		120	57.1							
- - -		$\left \left \right \right \left \right $		24.9		-color change to light gray grayel sized	- - -				
00 -		/ _{00.0} \				color change to light gray, gravel sized cemented sand nodules and shells.	-				
90		90.0		422							



PROJECT NUMBER: BORING NUMBER: 423783.FI.WI

IR78GW129-LCH

SHEET 4 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION : Hadnot Point, MBC Camp Lejeune, NC

DRILLING CONTRACTOR: Drill Pro ELEVATION: 8.19 ft above sea level

FAST_NORTH (UTM 718 NAD83 meters) : 285719 29 3838498 63 DRILLING METHOD AND FOUIPMENT: Roto Sonic SR-2 6" casing

EAST, NORTH (UTM Z18 N					ND EQUI	PMENT: Roto Sonio			—
WATER LEVEL: 15.4 ft BTC	C (5/25/201	2)	STA	RT: 11/12/2012	END: 11	/12/2012		A.Guilfoyle/CLT	$\overline{}$
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE INTERVAL (ft) (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBO COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURI MINERALOGY		DEPTH OF (RATE, DRIL	OMMENTS CASING, DRILLING LING FLUID LOSS, STRUMENTATION	WELL DIAGRA	M
		169		SAND (SP) Light gray, wet, loose, fine grained, 5- 10% silt, trace shell fragments.	- - - - - -				
95 RS-10	120	222			-				
	\	1385			-				
100 / 100.0 100.0 - / 100.0		1312		-decrease in fine (<5%), increase in shell fragments to few, medium grained.					
105_		786			-				
RS-11	120	89.1			-				
110 110.0		0.9			-				
		0.9			-				
115	120	0			-				
		1.2							
120 120.0		0.8			- - - - -				
				:	-				



BORING NUMBER: IR78GW129-LCH

SHEET 5 OF 6

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

ELEVATION: 8.19 ft above sea level DRILLING CONTRACTOR: Drill Pro

EAST, NORTH (UTM Z18 NA	AD83, mete	rs) : 28571	9.29, 383	38498.63 DRILLING METHOD ANI) EQU	IPMENT: Roto Sonic SR-2, 6" ca	sing	
WATER LEVEL: 15.4 ft BTOO	(5/25/201	2)	STA		ND: 1	1/12/2012	LOGGER : A.G	
DEPTH BELOW GROUND SURFACE (ft) SAMPLE TYPE INTERVAL (ft)	RECOVERY (inches)	PID SCREENING (ppm)	GRAPHIC LOG	SOIL DESCRIPTION SOIL NAME, USCS GROUP SYMBOL COLOR, MOISTURE CONTENT, RELATIVE DENSITY OR CONSISTENCY, SOIL STRUCTURE, MINERALOGY		COMMENTS DEPTH OF CASING, DI RATE, DRILLING FLUID TESTS, & INSTRUMEN	RILLING D LOSS,	WELL DIAGRAM
125 RS-13	120	0.8 1.6 1.8		SILTY SAND (SM) Gray, wet, medium dense, fine grained, 15-20% silt, cohesive, trace shell fragments.				
135 RS-14	60	0.5		SAND (SP) Gray, wet, loose, medium grained, <5% silt, trace shell fragments.				
140 140.0 14	0	0.8 1 1.1		SILTY SAND (SM) Gray, wet, medium dense, fine grained, 15-20% silt, poorly graded, trace shell fragments. (soil description on next page)				
		1.1		(Soil description on flext page)	- - - -			- - - -



PROJECT NUMBER:	BORING NUMBER:				
423783.FI.WI	IR78GW129-LCH	SHEET	6	OF	6

Soil Boring Log

CLIENT: NAVFAC PROJECT: Site 78 Additional Investigation LOCATION: Hadnot Point, MBC Camp Lejeune, NC

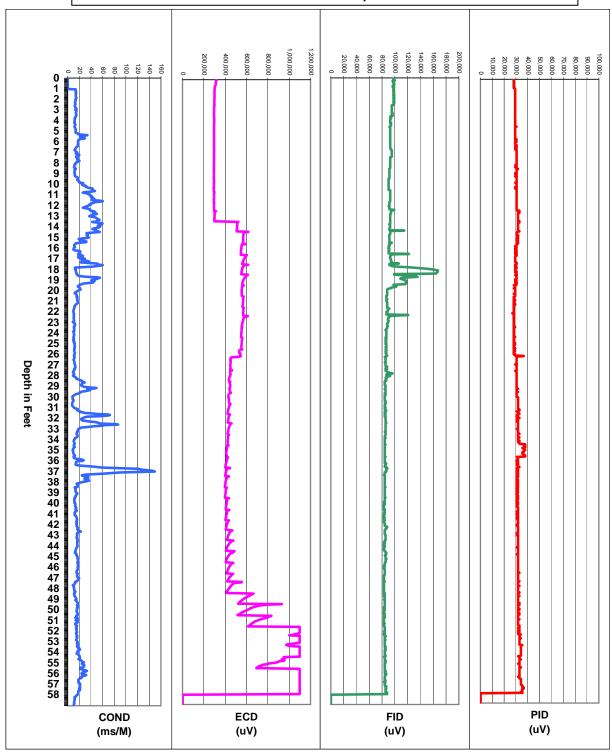
ELEVATION: 8.19 ft above sea level DRILLING CONTRACTOR: Drill Pro

EAST, NORTH (UTM Z18 NAD83, meters): 285719.29, 3838498.63 DRILLING METHOD AND EQUIPMENT: Roto Sonic SR-2, 6" casing

WATER LI	•			rs) : 28571 2)				11/12/2012		A.Guilfoyle/CLT
兴 兴	LVLL. 13.	41111100	(3/23/201	I		SOIL DESCRIPTION	IND.		COMMENTS	WELL
DEPTH BELOW GROUND SURFACE (ft)		Ļ	չ Հ	PID SCREENING (ppm)	GRAPHIC LOG	SOIL NAME. USCS GROUP SYMBOL.				DIAGRAM
H BEL D SUF	IPLE PE	ERV/	OVE	CREEN (ppm)	<u>⊇</u>	COLOR, MOISTURE CONTENT, RELATIVE		DEPTH OI	CASING, DRILLING	
DND)	SAMPLE TYPE	INTERVAL (ft)	RECOVERY (inches)	SCI	RAP	DENSITY OR		RATE, DR	ILLING FLUID LOSS, INSTRUMENTATION	
JROI S			ш.	딤	Ū	CONSISTENCY, SOIL STRUCTURE, MINERALOGY		12010, &	INSTROMENTATION	
						End of Boring Log at 150' bgs				_
-						Abbreviations:	-			-
							_			_
155_						bgs - below ground surface BTOC- below top of casing	_			
_						ft - feet				
_						HA - Hand Auger in - inch	-			_
_						NM - Not Measured	-			_
_						PID - photo ionization detector RS - Roto Sonic Run	_			
-							-			_
400 -							4			=
160							_			
							_			
-							-			-
										_
-							-			-
-										_
165							-			-
_										
-							-			-
										_
-							-			_
_										_
-							-			-
170_										_
-							-			-
										_
-							-			_
-										=
_							-			_
										-
175							-			
							1			- -
-							-			-
_										
-							-			=
_										- -
180							-			_
-							-			_
_							1			-
-							-			=
						•				

Attachment B MIP Logs

ZEBRA EC/MIP Summary Log, Point CHMIP1 Jacksonville, NC





for: CH2M HILL

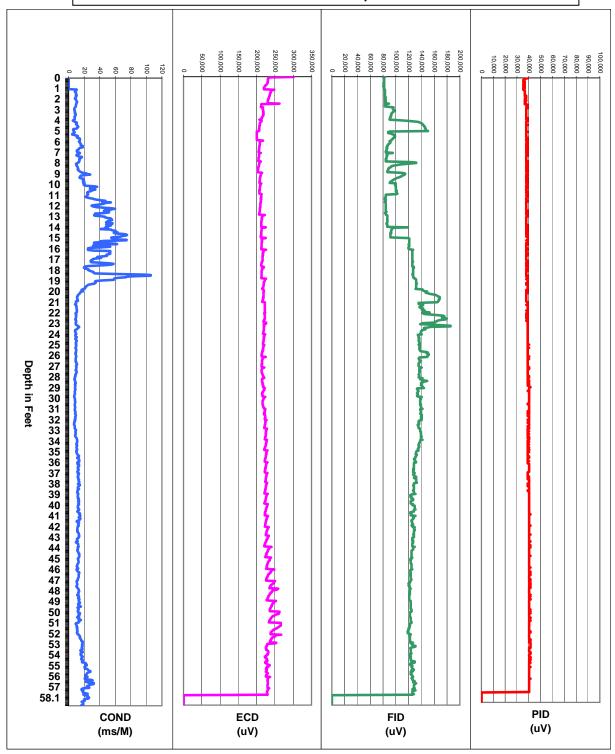
by: Zebra Environmental 30 No. Prospect Avenue Lynbrook, NY 11563 (516) 596-6300 Date: 6/11/2012

Proj. Name: Camp Lejeune

Proj. #: DS20975 Operators: Dan Ferrell

Point 1 of 0

ZEBRA EC/MIP Summary Log, Point CHMIP2 Jacksonville, NC





for: CH2M HILL

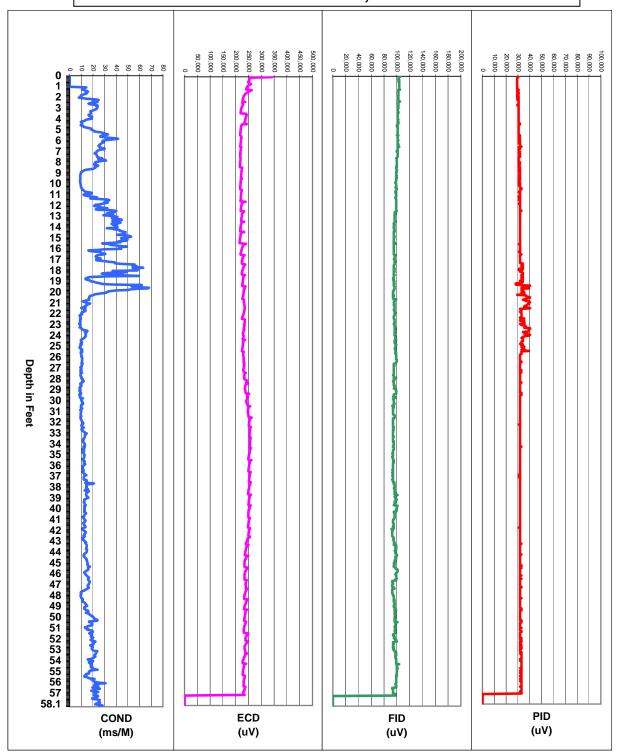
by: Zebra Environmental 30 No. Prospect Avenue Lynbrook, NY 11563 (516) 596-6300 Date: 6/11/2012

Proj. Name: Camp Lejeune

Proj. #: DS20975 Operators: Dan Ferrell

Point 2 of 0

ZEBRA EC/MIP Summary Log, Point CHMIP3 Jacksonville, NC





for: CH2M HILL

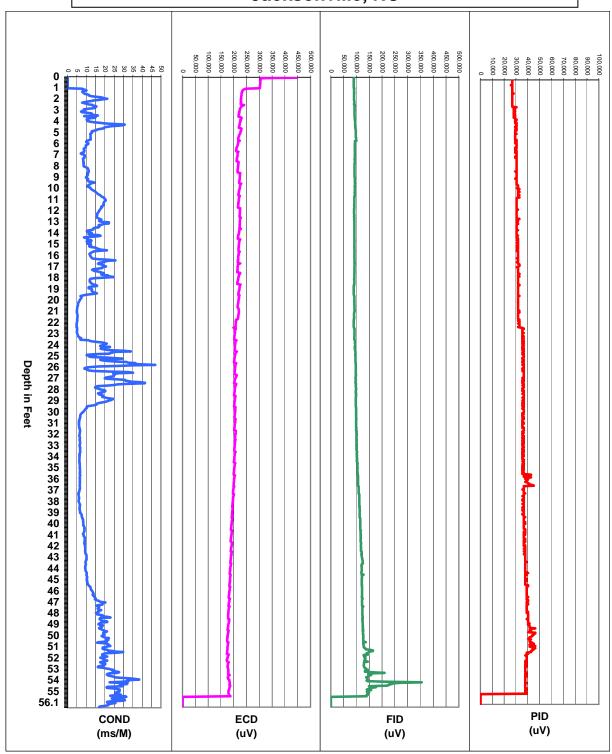
by: Zebra Environmental 30 No. Prospect Avenue Lynbrook, NY 11563 (516) 596-6300 Date: 6/12/2012

Proj. Name: Camp Lejeune

Proj. #: DS20975 Operators: Dan Ferrell

Point 3 of 0

ZEBRA EC/MIP Summary Log, Point CHMIP4 Jacksonville, NC





for: CH2M HILL

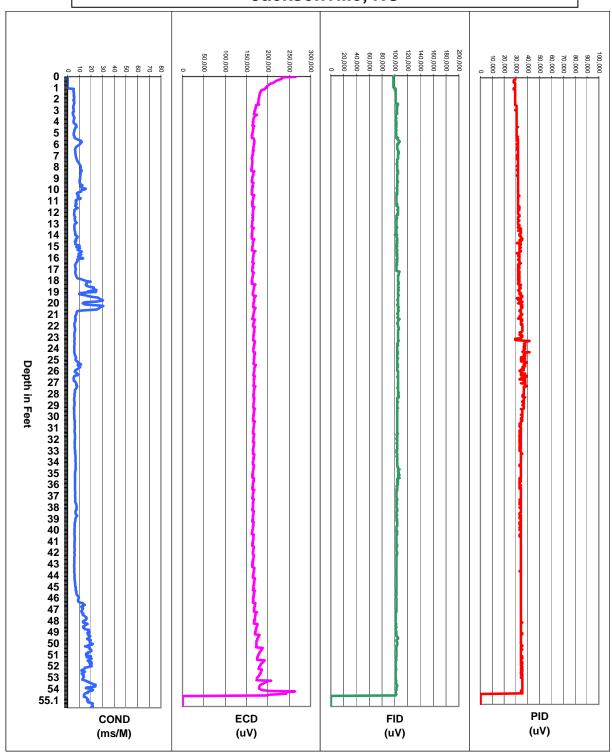
by: Zebra Environmental 30 No. Prospect Avenue Lynbrook, NY 11563 (516) 596-6300 Date: 6/12/2012

Proj. Name: Camp Lejeune

Proj. #: DS20975 Operators: Dan Ferrell

Point 4 of 0

ZEBRA EC/MIP Summary Log, Point CHMIP5 Jacksonville, NC





for: CH2M HILL

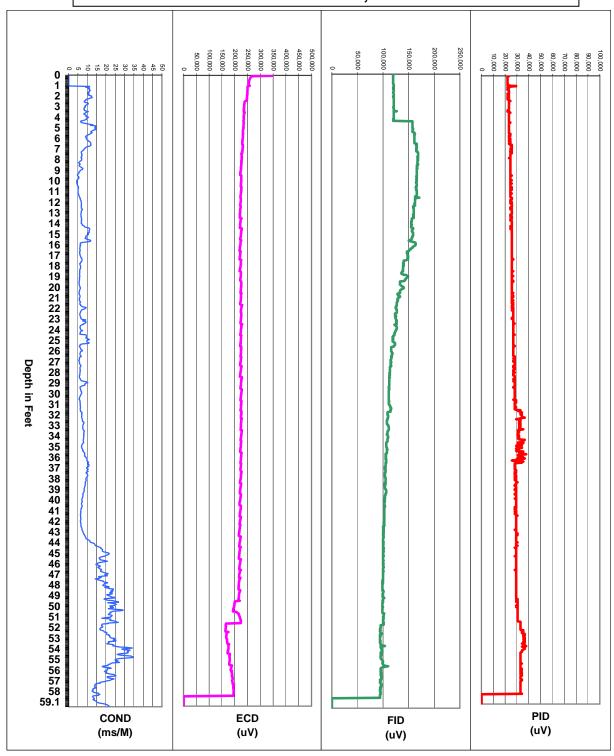
by: Zebra Environmental 30 No. Prospect Avenue Lynbrook, NY 11563 (516) 596-6300 Date: 4/25/2012

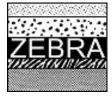
Proj. Name: Camp Lejeune

Proj. #: DS20975 Operators: Dan Ferrell

Point 5 of 0

ZEBRA EC/MIP Summary Log, Point CHMIP9 Jacksonville, NC





for: CH2M HILL

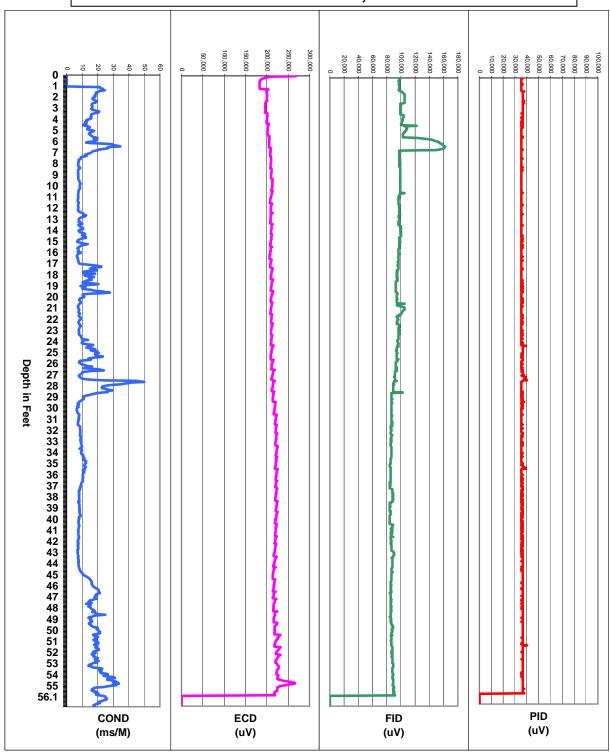
by: Zebra Environmental 30 No. Prospect Avenue Lynbrook, NY 11563 (516) 596-6300 Date: 6/13/2012

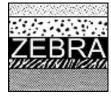
Proj. Name: Camp Lejeune

Proj. #: DS20975 Operators: Dan Ferrell

Point 9 of 0

ZEBRA EC/MIP Summary Log, Point CHMIP7 Jacksonville, NC





for: CH2M HILL

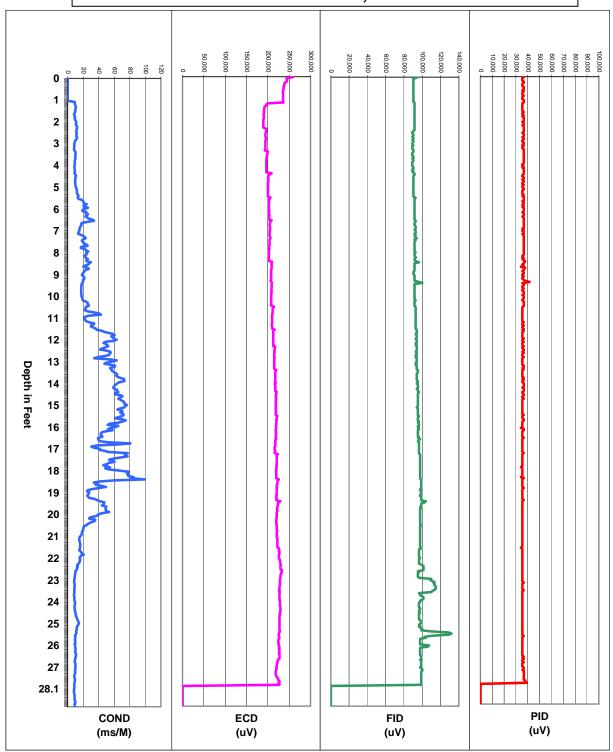
by: Zebra Environmental 30 No. Prospect Avenue Lynbrook, NY 11563 (516) 596-6300 Date: 6/13/2012

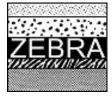
Proj. Name: Camp Lejeune

Proj. #: DS20975 Operators: Dan Ferrell

Point 7 of 0

ZEBRA EC/MIP Summary Log, Point CHMIP8 Jacksonville, NC





for: CH2M HILL

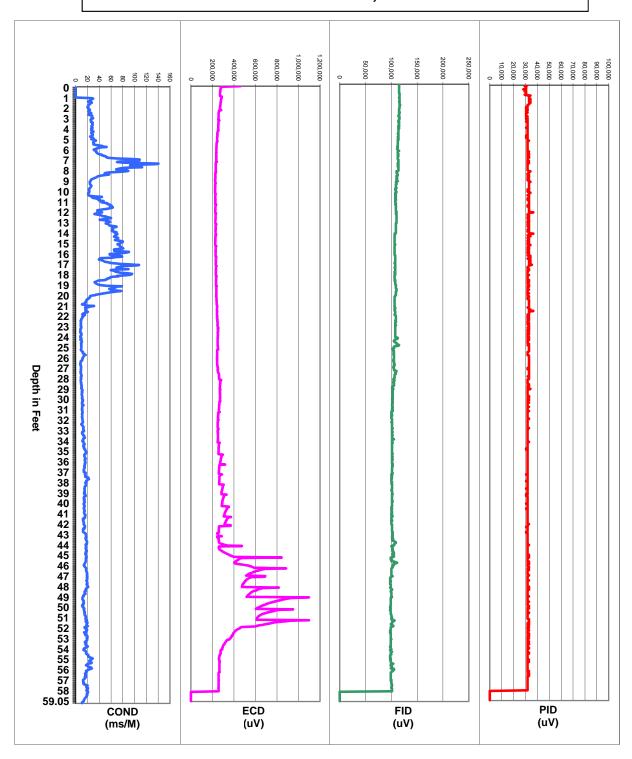
by: Zebra Environmental 30 No. Prospect Avenue Lynbrook, NY 11563 (516) 596-6300 Date: 6/13/2012

Proj. Name: Camp Lejeune

Proj. #: DS20975 Operators: Dan Ferrell

Point 8 of 0

ZEBRA EC/MIP Summary Log, Point CHMIP9 Jacksonville, NC





for: CH2M HILL by: Zebra Environmental 30 No. Prospect Avenue Lynbrook, NY 11563 (516) 596-6300

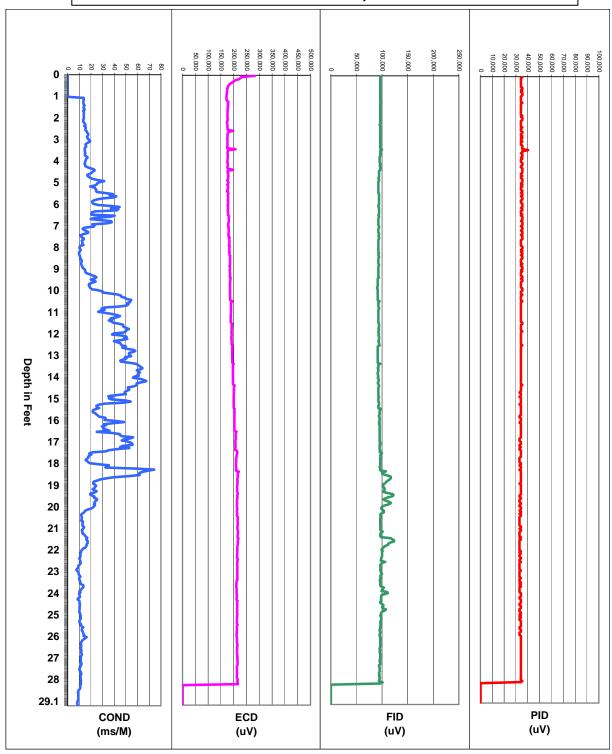
Date: 6/14/2012

Proj. Name: Camp Lejeune

Proj. #: DS20975 Operators: Dan Ferrell

Point 9 of 0

ZEBRA EC/MIP Summary Log, Point CHMIP10 Jacksonville, NC





for: CH2M HILL

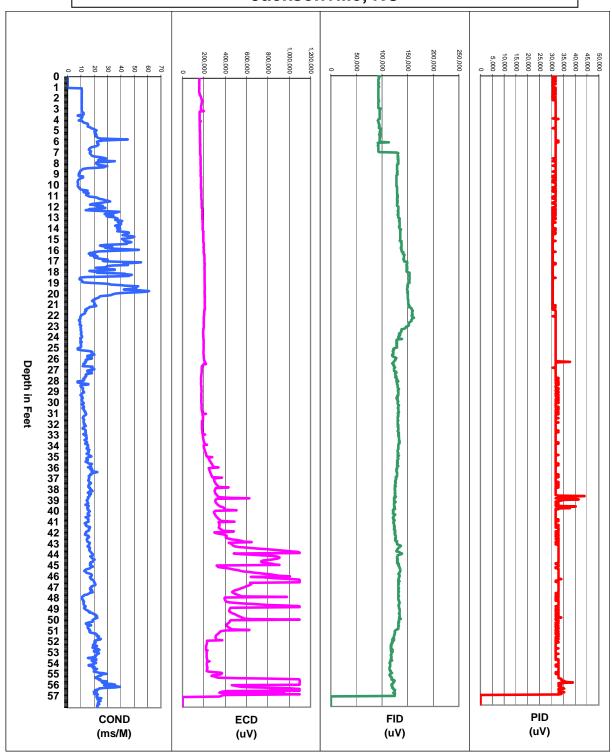
by: Zebra Environmental 30 No. Prospect Avenue Lynbrook, NY 11563 (516) 596-6300 Date: 6/14/2012

Proj. Name: Camp Lejeune

Proj. #: DS20975 Operators: Dan Ferrell

Point 10 of 0

ZEBRA EC/MIP Summary Log, Point CHMIP11 Jacksonville, NC





for: CH2M HILL

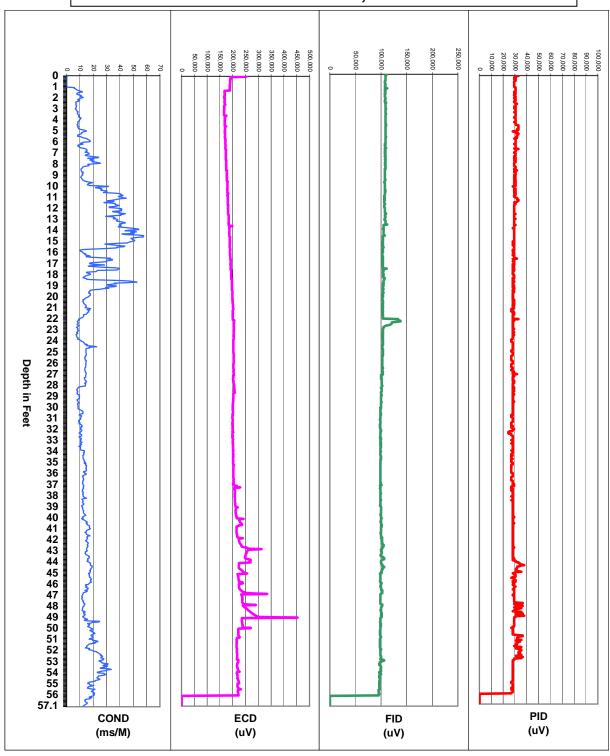
by: Zebra Environmental 30 No. Prospect Avenue Lynbrook, NY 11563 (516) 596-6300 Date: 6/14/2012

Proj. Name: Camp Lejeune

Proj. #: DS20975 Operators: Dan Ferrell

Point 11 of 0

ZEBRA EC/MIP Summary Log, Point CHMIP12 Jacksonville, NC





for: CH2M HILL

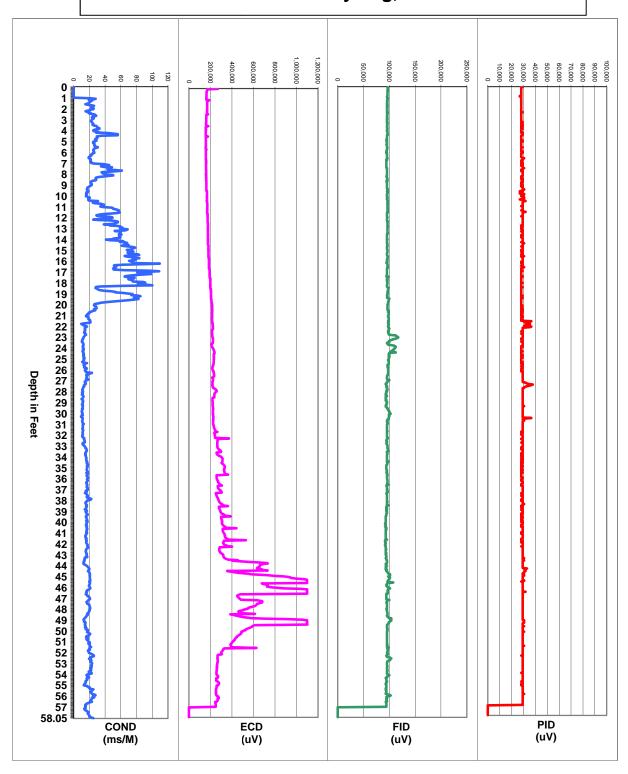
by: Zebra Environmental 30 No. Prospect Avenue Lynbrook, NY 11563 (516) 596-6300 Date: 6/15/2012

Proj. Name: Camp Lejeune

Proj. #: DS20975 Operators: Dan Ferrell

Point 12 of 0

ZEBRA EC/MIP Summary Log, Point CHMIP13





for: CH2M HILL by: Zebra Environmental 30 No. Prospect Avenue Lynbrook, NY 11563 (516) 596-6300

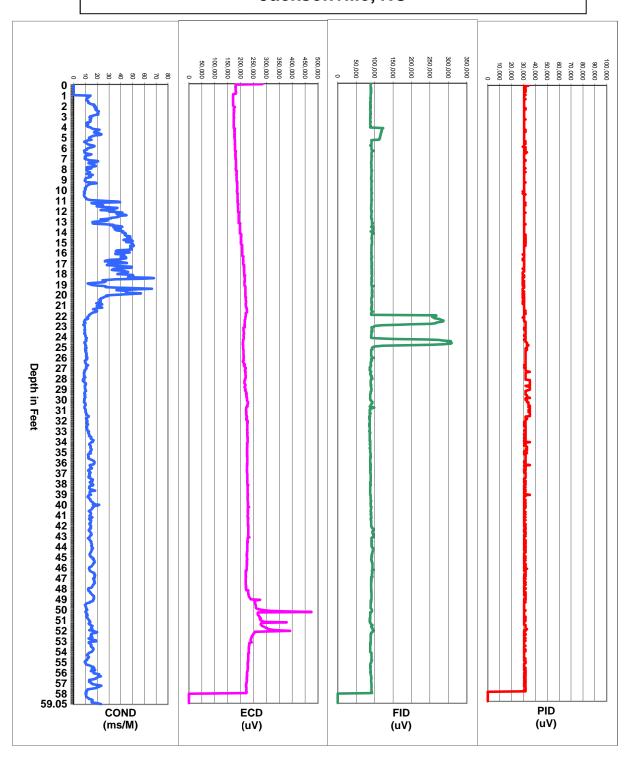
Date: 6/15/2012

Proj. Name: Camp Lejeune

Proj. #: DS20975 Operators: Dan Ferrell

Point 13 of 0

ZEBRA EC/MIP Summary Log, Point CHMIP14 Jacksonville, NC





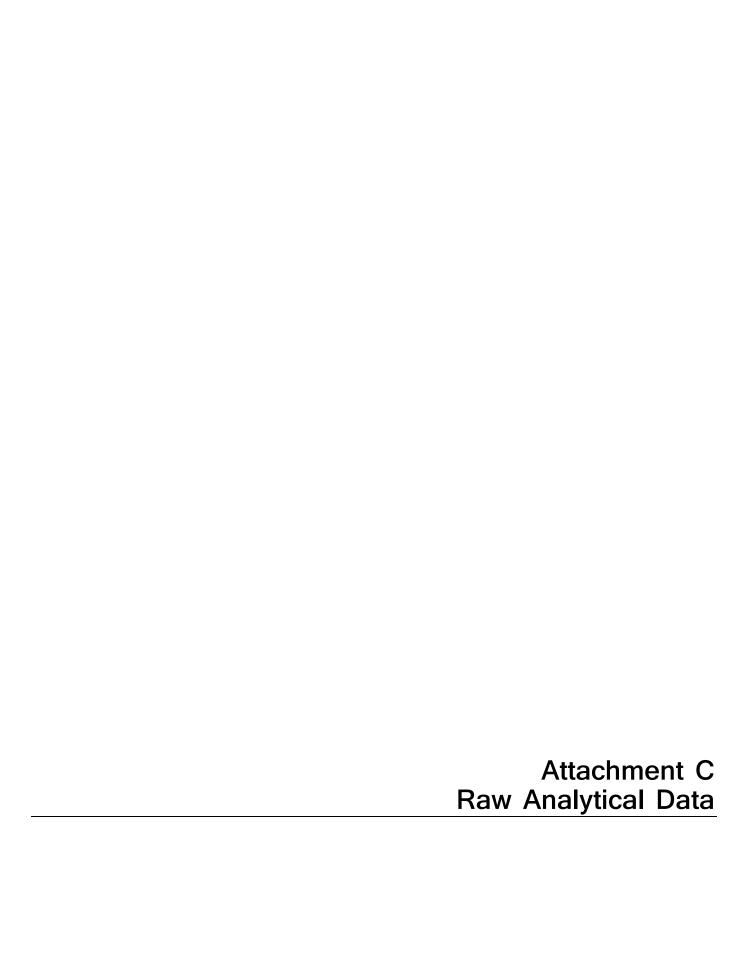
for: CH2M HILL by: Zebra Environmental 30 No. Prospect Avenue Lynbrook, NY 11563 (516) 596-6300

Date: 6/15/2012

Proj. Name: Camp Lejeune

Proj. #: DS20975 Operators: Dan Ferrell

Point 14 of 0



Attachment C Raw Passive Soil Gas Analytical Data Site 78 Technical Memorandum

	Station ID	IR78-SG-100	IR78-SG-101	IR78-SG-102	IR78-SG-103	IR78-SG-104	IR78-SG-105	IR78-SG-106	ID78_	SG-107	IR78-SG-108	IR78-SG-109	IR78-SG-110	IR78-SG-111	IR78-SG-112	IP78	8-SG-113	IR78-SG-114	IR78-SG-115
	ample ID:	IR78-SG-100-12A	IR78-SG-101-12A	IR78-SG-102-12A	IR78-SG-103-12A	IR78-SG-104-12A	IR78-SG-105-12A	IR78-SG-106-12A	IR78-SG-107-12A	IR78-SG-107 DUP-12A	IR78-SG-108-12A	IR78-SG-109-12A	IR78-SG-110-12A	IR78-SG-111-12A	IR78-SG-112-12A	IR78-SG-113-12A	IR78-SG-113 DUP-12A	IR78-SG-114-12A	IR78-SG-115-12A
	Units:	ng	ng	na	ng	ng	nn	na	ng	ng	na	ng	nn	na	nn	nn	nn	ng	nn
COMPOUNDS	OTINO.	9	···g	9	9	9	9	9	9	9	9	9	9	9	9	9	9	g	9
Vinyl Chloride		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Trichlorofluoromethane (Freon 11)		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1-Dichloroethene <25			<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Methylene Chloride		33.46	26.62	<25	87.94	<25	88.5	<25	<25	<25	<25	<25	53.22	85.44	<25	129.26	164.17	231.46	64.27
1,1,2-Trichlorotrifluoroethane (Fr.113)		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
trans-1,2-Dichloroethene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Methyl-t-butyl ether		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1-Dichloroethane <25			<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethene <25			<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Chloroform		<25	<25	115.73	<25	<25	1334.16	<25	<25	<25	<25	<25	<25	<25	<25	2011.46	2141.84	<25	<25
1,2-Dichloroethane		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1,1-Trichloroethane		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Carbon Tetrachloride		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Benzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Trichloroethene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,4-Dioxane		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1,2-Trichloroethane <25			<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Toluene		364.57	<25	<25	<25	109.25	<25	340.65	<25	<25	<25	<25	<25	35.82	56	47	36	<25	<25
1,2-Dibromoethane (EDB)		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Tetrachloroethene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1,1,2-Tetrachloroethane <25			<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Chlorobenzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Ethylbenzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
p & m-Xylene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1,2,2-Tetrachloroethane		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
p-Xylene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2,3-Trichloropropane		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
sopropylbenzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,3,5-Trimethylbenzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2,4-Trimethylbenzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,3-Dichlorobenzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,4-Dichlorobenzene		<25	<25	<25	<25	<25	<25	<25		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2-Dichlorobenzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2-Dibromo-3-chloropropane		<25	<25	<25	<25	<25	<25	<25	-	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2,4-Trichlorobenzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Naphthalene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2,3-Trichlorobenzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
2-Methylnaphthalene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25

Attachment C Raw Passive Soil Gas Analytical Data Site 78 Technical Memorandum

	tation ID	IR78-SG-116	IR78-SG-117	IR78-SG-118	IR78-SG-119	IR78-SG-120	IR78-SG-121	IR78-SG-122	IR78-SG-123	IR78-SG-124	IR78-SG-125	ID70	-SG-126	IR78-SG-127	IR78-SG-128	IR78-SG-129	IR78-SG-130
	mple ID:	IR78-SG-116-12A	IR78-SG-117-12A	IR78-SG-118-12A	IR78-SG-119-12A	IR78-SG-120-12A	IR78-SG-121-12A	IR78-SG-122-12A	IR78-SG-123-12A	IR78-SG-124-12A	IR78-SG-125-12A	IR78-SG-126-12A	IR78-SG-126 DUP-12A	IR78-SG-127-12A	IR78-SG-128-12A	IR78-SG-129-12A	IR78-SG-130-12A
Sa	Units:	IR76-3G-110-12A	IK76-3G-117-12A	IR70-3G-110-12A	IK76-3G-119-12A	IR76-3G-120-12A	IR76-3G-121-12A	IR70-3G-122-12A	IR76-3G-123-12A	IK70-3G-124-12A	IR76-3G-125-12A	IR76-3G-120-12A	1R76-3G-120 DUF-12A	IR70-3G-127-12A	IR76-3G-126-12A	IR70-3G-129-12A	IK76-3G-130-12F
COMPOUNDS	Offics.	ng	ng	rig	ng	ng	ng	ng	11g	ng	ilg	ng	ng	ng	ng	rig	ııç
Vinyl Chloride		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Trichlorofluoromethane (Freon 11)		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	-25 <2F
1,1-Dichloroethene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Methylene Chloride		<25	105.04	<25	144.92	38.02	41.96	<25	48.3	<25	<25	25	27	<25	<25	<25	153.55
1,1,2-Trichlorotrifluoroethane (Fr.113)		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
trans-1,2-Dichloroethene		76.06	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Methyl-t-butyl ether		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1-Dichloroethane		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
cis-1,2-Dichloroethene		49.08	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Chloroform		<25	<25	52.43	1393.18	72.66	<25	<25	100	<25	<25	<25	<25	<25	<25	30	<25
1,2-Dichloroethane		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1,1-Trichloroethane		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Carbon Tetrachloride		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Benzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Trichloroethene		2087.14	<25	<25	<25	<25	<25	<25	<25	25.69	<25	<25	<25	<25	<25	<25	<25
1,4-Dioxane		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1,2-Trichloroethane		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Toluene		125	<25	40	<25	37	<25	45	<25	<25	<25	36.75	55.17	<25	<25	<25	50.28
1,2-Dibromoethane (EDB)		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Tetrachloroethene		2211.81	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1,1,2-Tetrachloroethane		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Chlorobenzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Ethylbenzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
p & m-Xylene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,1,2,2-Tetrachloroethane		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
o-Xylene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2,3-Trichloropropane		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Isopropylbenzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,3,5-Trimethylbenzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2,4-Trimethylbenzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,3-Dichlorobenzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,4-Dichlorobenzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2-Dichlorobenzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2-Dibromo-3-chloropropane		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2,4-Trichlorobenzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
Naphthalene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
1,2,3-Trichlorobenzene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25
2-Methylnaphthalene		<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25	<25

Station ID	IR78-GW01	IR78-GW02	IR78-GW03	IR78-GW04-1	IR78-GW04-2	IR78-GW05	IR78-GW08	IR78-0	W09-1	IR78-	GW09-3	IR78-GW10	IR78-GW100MCH	IR78-GW101MCH	IR78-GW102MCH
Sample ID	IR78-GW01-11C	IR78-GW02-11C	IR78-GW03-11C	IR78-GW04-1-11C	IR78-GW04-2-11C	IR78-GW05-11C	IR78-GW08-11C	IR78-GW09-1-11C	IR78-GW09-1-12B	IR78-GW09-3-11C	IR78-GW09-3D-11C	IR78-GW10-11C	IR78-GW100MCH-11C	IR78-GW101MCH-11C	IR78-GW102MCH-11C
Sample Date	09/15/11	09/15/11	09/14/11	09/14/11	09/14/11	09/15/11	09/16/11	09/12/11	05/22/12	09/12/11	09/12/11	09/15/11	09/16/11	09/16/11	09/16/11
Chemical Name															
Volatile Organic Compounds (μg/L)															
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)	5.6	2 U	2 U	2 U	2 U	2 U	2 U	2 U	0.93 J	2 U	2 U	2 U	2 U	1.2 J	2 U
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	32	1 U	1 U
cis-1,2-Dichloroethene	5.1	1 U	1 U	1 U	1 U	1 U	1 U	0.75 J	0.93 J	1 U	1 U	1 U	1 U	1.2	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	10	1 U	1 U
Isopropylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	6.5	2 U	2 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5.6	1 U	1 U
Tetrachloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	16	1 U	1 U
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	9	1 U	1 U	1 U	1 U	1 U	1 U	40	44	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	95	1 U	1 U
Xylene, total	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	12	3 U	3 U

- Notes:

 Shading indicates detections

 D Compound identified in an analysis at a secondary dilution factor
 J Analyte present, value may or may not be accurate or precise
 JD Analyte present at a secondary dilution factor, value may or may not be accurate or precise
 U Not detected
 UD Analyte not detected at a secondary dilution factor
- UD Analyte not detected at a secondary dilution factor
- μg/L micrograms per liter

Station ID	IR78-GW103MCH	IR78-GW104LCH	IR78-GW105MCH	IR78-GW106MCH	IR78-GW107	IR78-G	SW108UCH	IR78-GW109UCH	IR78-GW11	IR78-GW110MCH	IR78-GW111MCH	IR78-GW112MCH
Sample ID	IR78-GW103MCH-11C	IR78-GW104LCH-11C	IR78-GW105MCH-11C	IR78-GW106MCH-11C	IR78-GW107-11C	IR78-GW108UCH-11C	IR78-GW108UCHD-11C	IR78-GW109UCH-11C	IR78-GW11-11C	IR78-GW110MCH-11C	IR78-GW111MCH-11C	IR78-GW112MCH-11C
Sample Date	09/16/11	09/16/11	09/16/11	09/16/11	09/15/11	09/15/11	09/15/11	09/15/11	09/15/11	09/14/11	09/14/11	09/14/11
<u> </u>	09/16/11	09/16/11	09/16/11	09/16/11	09/15/11	09/15/11	09/15/11	09/15/11	09/15/11	09/14/11	09/14/11	09/14/11
Chemical Name												
Volatile Organic Compounds (μg/L)												
1,1-Dichloroethane	1 U	1 U	1 U	1 U	2.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	7	1 U	1 U	23 J	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)	2 U	2 U	15	2 U	68	2 U	2 U	360	2 U	2 U	2 U	5
Benzene	1 U	1 U	1 U	1 U	0.59 J	1 U	1 U	0.64 J	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	0.51 J	1 U	14	1 U	67	1 U	1 U	360	1 U	1 U	1 U	5
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.4 J	1 U	1 U	1 U	1 U
Trichloroethene	1 U	1 U	28	1 U	26	1 U	1 U	12,000	1 U	1 U	1 U	1 U
Vinyl chloride	1 U	1 U	1 U	1 U	3.4	1 U	1 U	2.5 J	1 U	1 U	1 U	1 U
Xylene, total	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Notes:

Shading indicates detections

D - Compound identified in an analysis at a secondary dilution factor
J - Analyte present, value may or may not be accurate or precise
JD - Analyte present at a secondary dilution factor, value may or may not be accurate or precise
U - Not detected
UD - Analyte not detected at a secondary dilution factor

UD - Analyte not detected at a secondary dilution factor

Station ID	IR78-	GW113	IR78-GW114	IR78-GW115	IR78-GW117UCH	IR78-GW12	IR78-GW121UCH	IR78-GW	122UCH	IR78-GW123UCH	IR78-GW124UCH	IR78-GW125MCH	IR78-GW126MCH	IR78-GW127MCH
Sample ID	IR78-GW113-12B	IR78-GW113D-12B	IR78-GW114-12B	IR78-GW115-12B	IR78-GW117UCH-12B	IR78-GW12-11C	IR78-GW121UCH-12A	IR78-GW122UCH-12B	IR78-GW122UCHD-12B	IR78-GW123UCH-12B	IR78-GW124UCH-12B	IR78-GW125MCH-12B	IR78-GW126MCH-12B	IR78-GW127MCH-12B
Sample Date	05/22/12	05/22/12	05/23/12	05/24/12	05/24/12	09/14/11	04/05/12	05/22/12	05/22/12	05/22/12	05/22/12	05/24/12	05/24/12	05/24/12
Chemical Name														
Volatile Organic Compounds (μg/L)														
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	40 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	40 U	3.8	3.5	3.5	3	3	2.1	1.5 J
1,2-Dibromo-3-chloropropane	5 U	5 U	5 U	5 U	5 U	1 U	150 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	40 U	1 U	1 U	1 U	1 U	0.64 J	1 U	1 U
1,2-Dichloroethene (total)	20	19	5	1 U	9.5	2 U	430	170	170	160	140	980 D	380 D	330 D
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	40 U	1 U	1 U	1 U	1 U	1.5 J	0.88 J	0.9 J
cis-1,2-Dichloroethene	20	19	2.2	1 U	9	1 U	430	170	170	160	140	790 D	320 D	250 D
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	40 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	40 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	2 U	2 U	2 U	2 U	2 U	2 U	80 U	2 U	2 U	2 U	2 U	2 J	2 U	2 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	69 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	1 U	1 U	1 U	1 U	1 U	1 U	40 U	1 U	1 U	1 U	1 U	3	0.65 J	1 U
Tetrachloroethene	1 U	1 U	14	1 U	1 U	1 U	40 U	1 U	1 U	1 U	1 U	190 D	89	68
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	46 U	1 U	1 U	1 U	1.3 J	1 U	1 U	1 U
trans-1,2-Dichloroethene	1 U	1 U	2.8	1 U	1 U	1 U	40 U	1.2 J	1.2 J	0.76 J	0.82 J	190 D	73	81
Trichloroethene	1.7 J	1.5 J	9.5	1 U	23	1 U	11,000	5,400 D	4,900 D	5,100 D	4,300 D	1,900 D	1,100 D	1,100 D
Vinyl chloride	1 U	1 U	1 U	1 U	1.7 J	1 U	40 U	1 U	1 U	1 U	1 U	27	14	10
Xylene, total	3 U	3 U	3 U	3 U	3 U	3 U	40 U	3 U	3 U	3 U	3 U	5	3 U	3 U

- Notes:

 Shading indicates detections

 D Compound identified in an analysis at a secondary dilution factor
 J Analyte present, value may or may not be accurate or precise
 JD Analyte present at a secondary dilution factor, value may or may not be accurate or precise
 U Not detected
 UD Analyte not detected at a secondary dilution factor
- UD Analyte not detected at a secondary dilution factor
- μg/L micrograms per liter

Station ID	IR78-GW128MCH	IR78-GW129LCH	IR78-GW13	IR78-GW14	IR78-GW16	IR78-GW17-1	IR78-GW17-2	IR78-GW17-4	IR78-0	GW20	IR78-GW21	IR78-GW22	IR78-G\	N22-1	IR78-GW23	IR78-GW24-1
Sample ID	IR78-GW128MCH-12B	IR78-GW129LCH-12D	IR78-GW13-11C	IR78-GW14-11C	IR78-GW16-11C	IR78-GW17-1-11C	IR78-GW17-2-11C	IR78-GW17-4-11C	IR78-GW20-11C	IR78-GW20D-11C	IR78-GW21-11C	IR78-GW22-11C	IR78-GW22-1-11C	IR78-GW22-1D-11C	IR78-GW23-11C	IR78-GW24-1-11C
Sample Date	05/22/12	11/15/12	09/17/11	09/16/11	09/16/11	09/16/11	09/16/11	09/17/11	09/16/11	09/16/11	09/17/11	09/16/11	09/18/11	09/18/11	09/15/11	09/13/11
Chemical Name																
Volatile Organic Compounds (μg/L)																
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	5 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	3.4	1 U	1 U	1 U	1 U	1 U	81	76	1 U	1 U
1,2-Dichloroethene (total)	1 U	1 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	20	110
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	53	49	2.1	1 U
cis-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	19	110
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1	1.2	1.1	1 U
Isopropylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.81 J	1 U
m- and p-Xylene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	9	9.6	2 U	2 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	6.5	7.4	3.9	1 U
Tetrachloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	2.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	17	17	0.83 J	1 U
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.4	3.8
Trichloroethene	11	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.3
Vinyl chloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	6	2.5
Xylene, total	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	16	17	4.4	3 U

Notes:

Shading indicates detections

D - Compound identified in an analysis at a secondary dilution factor
J - Analyte present, value may or may not be accurate or precise
JD - Analyte present at a secondary dilution factor, value may or may not be accurate or precise
U - Not detected
UD - Analyte not detected at a secondary dilution factor

UD - Analyte not detected at a secondary dilution factor

Station ID	IR78-GW24-2	IR78-GW24-3	IR78-G	W25	IR78-GW26	IR78-	GW29	IR78-GW30-2	IR78-GW30-3	IR78-GW31-2	IR78-GW31-3	IR78-GW32-2	IR78-G	W32-3	IR78-GW34	IR78-GW35
Sample ID	IR78-GW24-2-11C	IR78-GW24-3-11C	IR78-GW25-11C	IR78-GW25D-11C	IR78-GW26-11C	IR78-GW29-11C	IR78-GW29D-11C	IR78-GW30-2-11C	IR78-GW30-3-11C	IR78-GW31-2-11C	IR78-GW31-3-11C	IR78-GW32-2-11C	IR78-GW32-3-11C	IR78-GW32-3D-11C	IR78-GW34-11C	IR78-GW35-11C
Sample Date	09/13/11	09/13/11	09/15/11	09/15/11	09/16/11	09/14/11	09/14/11	09/16/11	09/16/11	09/15/11	09/15/11	09/27/11	09/27/11	09/27/11	09/16/11	09/16/11
Chemical Name																
Volatile Organic Compounds (μg/L)																
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	8.6	1.7	1 U	1 U	1 U	1 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	6.6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	8.4	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	4.1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	1.2	1 U	1 U	1 U	1 U	1 U	1 U	12	1.1	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Xylene, total	3 U	3 U	3 U	3 U	3 U	3 U	3 U	12	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

Notes:

Shading indicates detections

D - Compound identified in an analysis at a secondary dilution factor
J - Analyte present, value may or may not be accurate or precise
JD - Analyte present at a secondary dilution factor, value may or may not be accurate or precise
U - Not detected
UD - Analyte not detected at a secondary dilution factor

UD - Analyte not detected at a secondary dilution factor

Station ID	IR78-0	SW36	IR78-GW37	IR78-GW39	IR78-GW40	IR78-GW42	IR78-GW43	IR78-GW44	IR78-GW45R	IR78-GW46	IR78-GW47	IR78-GW48	IR78-GW50	IR78-GW51R	IR78-GW52R	IR78-GW53R	IR78-GW54R
Sample ID	IR78-GW36-11C	IR78-GW36D-11C	IR78-GW37-11C	IR78-GW39-11C	IR78-GW40-11C	IR78-GW42-11C	IR78-GW43-11C	IR78-GW44-11C	IR78-GW45R-11C	IR78-GW46-11C	IR78-GW47-11C	IR78-GW48-11C	IR78-GW50-11C	IR78-GW51R-11C	IR78-GW52R-11C	IR78-GW53R-11C	IR78-GW54R-11C
Sample Date	09/14/11	09/14/11	09/14/11	09/17/11	09/15/11	09/15/11	09/15/11	09/16/11	09/15/11	09/15/11	09/15/11	09/16/11	09/15/11	09/15/11	09/15/11	09/15/11	09/14/11
Chemical Name																	
Volatile Organic Compounds (μg/L)																	
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	120	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.2	2 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	14	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	0.94 J	2 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U
1,2-Dichloroethene (total)	2 U	2 U	2 U	2 U	2 U	500	120	250	2 U	1.5 J	1.6 J	2 U	2 U	2 U	81	4 U	2.4
Benzene	1 U	1 U	1 U	1 U	1 U	2.6	1.4	1 U	1 U	8	2.7	1 U	1 U	1 U	9.1	220	1 U
cis-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	500	120	250	1 U	1.5	1.6	1 U	1 U	1 U	81	2 U	2.4
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1.6	1 U	1 U	1 U	1 U	1 U	1 U	1 U	60	52	1 U
Isopropylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	4.7	2 U	1 U
m- and p-Xylene	2 U	2 U	2 U	2 U	2 U	2 U	7.3	2 U	2 U	2 U	2 U	2 U	2 U	2 U	24	37	2 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	10 U	5 U
o-Xylene	1 U	1 U	1 U	1 U	1 U	0.95 J	3.3	1 U	1 U	1 U	1 U	1 U	1 U	1 U	9.7	17	1 U
Tetrachloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U
Toluene	1 U	1 U	1 U	1 U	1 U	2.5	5.5	1 U	1 U	1 U	1 U	1 U	1 U	1 U	6.7	110	1 U
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	2.1	3.9	3.1	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2 U	1 U
Trichloroethene	1 U	1 U	1 U	1 U	1 U	8.1	0.97 J	1.8	1 U	1 U	12	1 U	1 U	1 U	1 U	2 U	1 U
Vinyl chloride	1 U	1 U	1 U	1 U	1 U	140	56	110	1 U	1 U	1 U	1 U	1 U	1 U	180	2 U	1.2
Xylene, total	3 U	3 U	3 U	3 U	3 U	3 U	11	3 U	3 U	3 U	3 U	3 U	3 U	3 U	34	54	3 U

Notes:

Shading indicates detections

D - Compound identified in an analysis at a secondary dilution factor
J - Analyte present, value may or may not be accurate or precise
JD - Analyte present at a secondary dilution factor, value may or may not be accurate or precise
U - Not detected
UD - Analyte not detected at a secondary dilution factor

UD - Analyte not detected at a secondary dilution factor

Station ID	IR78-GW56	IR78-GW57	IR78-GW59	ID78	-GW60	IR78-GW63	IR78-GW64	IR78-GW65	IR78-GW66	IR78-GW68	IR78-GW71	IR78-GW72	IR78-GW73	IR78-GW74		IR78-GW75-1	
Sample ID	IR78-GW56-11C	IR78-GW57-11C	IR78-GW59-11C	IR78-GW60-11C		IR78-GW63-11C	IR78-GW64-11C	IR78-GW65-11C	IR78-GW66-11C	IR78-GW68-11C	IR78-GW71-11C	IR78-GW72-11C	IR78-GW73-11C	IR78-GW74-11C	IR78-GW75-1-11C	IR78-GW75-1D-11C	IR78-GW75-1-12B
Sample Date	09/14/11	09/15/11	09/14/11	09/15/11	05/23/12	09/14/11	09/14/11	09/14/11	09/14/11	09/14/11	09/13/11	09/12/11	09/12/11	09/12/11	09/13/11	09/13/11	05/23/12
<u> </u>	09/14/11	09/13/11	09/14/11	09/13/11	03/23/12	09/14/11	09/14/11	09/14/11	03/14/11	03/14/11	09/13/11	09/12/11	09/12/11	03/12/11	03/13/11	03/13/11	03/23/12
Chemical Name																	
Volatile Organic Compounds (μg/L)																	
1,1-Dichloroethane	1 U	1 U	1 U	1 U	3.1	1 U	1 U	1	3.2	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.1	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	5 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)	2 U	2 U	3.1	1.8 J	26	17	9.6	18	1.6 J	2 U	430	180	2 U	170	130	110	62
Benzene	1 U	1 U	1 U	1 U	25 UD	1 U	1 U	1 U	1 U	1 U	1.1	1.3	1 U	100	1,000	1,100	130
cis-1,2-Dichloroethene	0.77 J	0.57 J	3.1	1.8 J	25 JD	16	9.6	17	1.6	1.1	420	180	1 U	160	130	110	61
Ethylbenzene	1 U	1 U	1 U	1,900	670 D	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1,200	990	1,100	990 D
Isopropylbenzene	1 U	1 U	1 U	160 J	26 JD	1 U	1 U	1 U	1 U	1 U	1 U	1 U	3.9	79	80	91	37
m- and p-Xylene	2 U	2 U	2 U	6,000	1,700 D	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	3,600	3,500	3,800	3,000 D
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	1 U	1 U	1 U	2,100	930 D	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1,400	1,500	1,700	1,400 D
Tetrachloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	10	2.9	1 U	1 U	1 U
Toluene	1 U	1 U	1 U	210	56 D	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2,200	15,000	15,000	8,400 D
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	8.4	5.3	1 U	1 U	1 U	1 U	1 U
Trichloroethene	1.2	1 U	1 U	420	170	2	1.4	0.9 J	1 U	1 U	15	1.9	1 U	1 U	1 U	1 U	1.9 J
Vinyl chloride	1 U	0.78 J	1.4	1 U	1 U	1 U	1 U	2.1	41	1 U	250	110	1 U	1 U	1.3	1.2	1.1 J
Xylene, total	3 U	3 U	3 U	8,200	2,700 D	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	5,000	5,100	5,400	4,400 D

- Notes:

 Shading indicates detections

 D Compound identified in an analysis at a secondary dilution factor
 J Analyte present, value may or may not be accurate or precise
 JD Analyte present at a secondary dilution factor, value may or may not be accurate or precise
 U Not detected
 UD Analyte not detected at a secondary dilution factor
- UD Analyte not detected at a secondary dilution factor

Station ID	IR78-GW75-2	IR78-	GW76	IR78-GW77	IR78-GW79IW	IR78-GW80DW	IR78-C	SW80IW	IR78-GW81DW	IR78-GW81IW	IR78-GW82IW	IR78-GW83IW	IR78-GW84IW
Sample ID	IR78-GW75-2-11C	IR78-GW76-11C	IR78-GW76-12B	IR78-GW77-11C	IR78-GW79IW-11C	IR78-GW80DW-11C	IR78-GW80IW-11C		IR78-GW81DW-11C	IR78-GW81IW-11C	IR78-GW82IW-11C	IR78-GW83IW-11C	IR78-GW84IW-11C
Sample Date	09/13/11	09/12/11	05/23/12	09/12/11	09/17/11	09/17/11	09/17/11	09/17/11	09/16/11	09/16/11	09/17/11	09/16/11	09/13/11
Chemical Name													
Volatile Organic Compounds (μg/L)													
1,1-Dichloroethane	10 U	1 U	1 U	20 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	10 U	1 U	1 U	20 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	10 U	1 U	5 U	20 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	10 U	1 U	1 U	20 U	1 U	7.8	13	13	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)	160	350	430 D	40 U	2 U	1.4 J	1.3 J	1.3 J	2 U	2 U	2 U	2 U	57
Benzene	120	1 U	1 U	20 U	6.4	59	180	180	1 U	1 U	4.3	1 U	0.77 J
cis-1,2-Dichloroethene	160	400	430 D	20 U	0.67 J	1.4	1.3	1.3	1 U	1 U	1 U	1 U	56
Ethylbenzene	97	200	140	1,500	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	10 U	76	69	50	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
m- and p-Xylene	100	1,600	1,300 D	4,200	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	50 U	5 U	5 U	100 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U
o-Xylene	38	480	470 D	1,300	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	10 U	1.1	1 J	20 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Toluene	570	11	6.9	2,300	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	10 U	3	2.6	20 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Trichloroethene	11	420	330 D	200	1 U	1 U	2.1	2	1 U	1 U	1 U	1 U	1 U
Vinyl chloride	10 U	0.93 J	1.2 J	20 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	10
Xylene, total	140	2,100	1,800 D	5,500	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

- Notes:

 Shading indicates detections

 D Compound identified in an analysis at a secondary dilution factor
 J Analyte present, value may or may not be accurate or precise
 JD Analyte present at a secondary dilution factor, value may or may not be accurate or precise
 U Not detected
 UD Analyte not detected at a secondary dilution factor
- UD Analyte not detected at a secondary dilution factor

Station ID	IR78-GW85	IR78-GW85IW	IR78-GW86DW	IR78-GW87MCH	IR78-0	SW88UCH	IR78-GW89MCH	IR78-GW90MCH	IR78-GW91LCH	IR78-GW92MCH	IR78-GW93MCH	IR78-GW94LCH
Sample ID	IR78-GW85-11C	IR78-GW85IW-11C	IR78-GW86DW-11C	IR78-GW87MCH-11C	IR78-GW88UCH-11C	IR78-GW88UCHD-11C	IR78-GW89MCH-11C	IR78-GW90MCH-11C	IR78-GW91LCH-11C	IR78-GW92MCH-11C	IR78-GW93MCH-11C	IR78-GW94LCH-11C
•												
Sample Date	09/15/11	09/15/11	09/17/11	09/16/11	09/15/11	09/15/11	09/16/11	09/16/11	09/16/11	09/16/11	09/16/11	09/16/11
Chemical Name												
Walatila Garania Garana and Laufi												
Volatile Organic Compounds (μg/L)												
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1.6	1.7	1 U	15 J	1 U	1.1	1 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	0.5 J	1 U	1 U	1 U	1 U	1 U	7.7 J	1 U	6.9	1 U	1 U
1,2-Dichloroethene (total)	2 U	2 U	2 U	1.4 J	46	42	300	8,900	2 U	61	86	2 U
Benzene	1 U	1.4	1 U	1	5.3	4.8	1 U	5.3 J	1 U	130	1 U	0.85 J
cis-1,2-Dichloroethene	1 U	0.95 J	1 U	1.4	39	35	200	6,700	1 U	50	86	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Isopropylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.1	1 U	1 U
m- and p-Xylene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	9.6	5 U	5 U	5 U
o-Xylene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Tetrachloroethene	1 U	1 U	1 U	1 U	1 U	1 U	6.3	140 J	1 U	0.76 J	1 U	1 U
Toluene	1 U	1 U	0.68 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	7.5	6.9	100	2,200	1 U	11	1 U	1 U
Trichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	150	9,500	1 U	35	1 U	0.64 J
Vinyl chloride	1 U	1 U	1 U	23	39	37	0.92 J	110 J	1 U	15	0.78 J	1 U
Xylene, total	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U

- Notes:
 Shading indicates detections

 D Compound identified in an analysis at a secondary dilution factor
- J Analyte present, value may or may not be accurate or precise
- JD Analyte present at a secondary dilution factor, value may or may not be accurate or precise
- U Not detected UD Analyte not detected at a secondary dilution factor
- μg/L micrograms per liter

Station ID	IR78-GW95MCH	IR78-GW96MCH	IR78-GW97LCH	IR78-0	SW98MCH	IR78-GW99MCH	IR78-GWXXMCH	IR78-	MWVI01	IR78-MW1	16MCH	IR78-RW03	IR78-RW04	IR78-RW05
Sample ID	IR78-GW95MCH-11C	IR78-GW96MCH-11C	IR78-GW97LCH-11C	IR78-GW98MCH-11C	IR78-GW98MCHD-11C	IR78-GW99MCH-11C	IR78-GWXXMCH-12B	IR78-MWVI01-11C	IR78-MWVI01-D-11C	IR78-GW116MCH-12A	IR78-GW116MCHD-12A	IR78-RW03-11C	IR78-RW04-11C	IR78-RW05-11C
Sample Date	09/16/11	09/16/11	09/16/11	09/16/11	09/16/11	09/15/11	05/24/12	09/13/11	09/13/11	03/30/12	03/30/12	09/16/11	09/16/11	09/14/11
Chemical Name														
Volatile Organic Compounds (μg/L)														
1,1-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5.7 U	5.7 U	1 U	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	4.9 J	12 J	1 U	1 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	1 U	1 U	5 U	1 U	1 U	21 U	21 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5.7 U	5.7 U	1 U	1 U	1 U
1,2-Dichloroethene (total)	2 U	2 U	2 U	2 U	2 U	2 U	1 U	84	89	860	810	2 U	2 U	2 U
Benzene	1 U	1 U	1 U	1 U	1 U	1 U	2.4	2.2	2.3	5.7 U	5.7 U	1 U	1 U	1 U
cis-1,2-Dichloroethene	1 U	1 U	1 U	0.76 J	0.67 J	1 U	1 U	82	87	710	670	1 U	1 U	1 U
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5.7 U	5.7 U	1 U	1 U	1 U
Isopropylbenzene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5.7 U	5.7 U	1 U	1 U	1 U
m- and p-Xylene	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	11 U	11 U	2 U	2 U	2 U
Methylene chloride	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	5 U	34 U	30 U	5 U	5 U	5 U
o-Xylene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U	5.7 U	5.7 U	1 U	1 U	1 U
Tetrachloroethene	1 U	0.99 J	1 U	1 U	1 U	1 U	1 U	1 U	1 U	47	44	1 U	1 U	1 U
Toluene	1 U	1 U	1 U	1 U	1 U	1 U	2.3	1 U	1 U	13 J	8.7 U	1 U	1 U	1 U
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	1.9	2.3	150	140	1 U	1 U	1 U
Trichloroethene	1 U	1 U	1 U	1 U	1 U	1 U	1 U	2.9	3	2,700	2,500	1 U	1 U	1 U
Vinyl chloride	1 U	1 U	1 U	1 U	1 U	1 U	7.6	25	25	25 J	21 J	1 U	1 U	1 U
Xylene, total	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	3 U	5.7 U	5.7 U	3 U	3 U	3 U

Notes: Shading indicates detections D - Compound identified in an analysis at a seconda

- J Analyte present, value may or may not be accura
- $\ensuremath{\mathsf{JD}}$ Analyte present at a secondary dilution factor, ν
- U Not detected
- UD Analyte not detected at a secondary dilution far
- μg/L micrograms per liter

D 15									
Station ID	IR78-RW07		IR78-RW09R	IR78-RW10	IR78-RW11	IR78-RW12	IR78-RW13	IR78-RW14	IR78-RW15
Sample ID	IR78-RW07-11C	IR78-RW07D-11C	IR78-RW09R-11C	IR78-RW10-11C	IR78-RW11-11C	IR78-RW12-11C	IR78-RW13-11C	IR78-RW14-11C	IR78-RW15-11C
Sample Date	09/13/11	09/13/11	09/14/11	09/13/11	09/13/11	09/13/11	09/16/11	09/16/11	09/13/11
Chemical Name									
Volatile Organic Compounds (μg/L)									
1,1-Dichloroethane	1 U	1 U	1 U	1 U	2 U	1 U	4.8	1 U	1 U
1,1-Dichloroethene	1 U	1 U	1 U	1 U	2 U	1 U	2.3	1 U	1 U
1,2-Dibromo-3-chloropropane	1 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U
1,2-Dichloroethane	1 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1 U
1,2-Dichloroethene (total)	1.2 J	2 U	2 U	1.3 J	110	65	56	2 U	120
Benzene	1 U	1 U	1 U	4.6	1.2 J	4.7	13	1 U	100
cis-1,2-Dichloroethene	1.2	1	1 U	1.3	100	62	56	0.97 J	120
Ethylbenzene	1 U	1 U	1 U	1 U	2 U	1 U	0.83 J	1 U	180
Isopropylbenzene	1 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	18
m- and p-Xylene	2 U	2 U	2 U	2 U	4 U	1.5 J	2 U	2 U	640
Methylene chloride	5 U	5 U	5 U	5 U	10 U	5 U	5 U	5 U	5 U
o-Xylene	0.65 J	1 U	1 U	1 U	2 U	0.75 J	0.81 J	1 U	200 J
Tetrachloroethene	1 U	1 U	1 U	1 U	2 U	1 U	1 U	1 U	1
Toluene	1 U	1 U	1 U	1 U	2 U	1 U	0.92 J	1 U	730 J
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	3.1	2.8	1 U	1 U	1 U
Trichloroethene	1 U	1 U	1 U	0.56 J	1.5 J	20	5.4	1.3	19
Vinyl chloride	1 U	1 U	1 U	1 U	240	7.5	45	1 U	1 U
Xylene, total	3 U	3 U	3 U	3 U	6 U	2.2 J	3 U	3 U	840

- Shading indicates detections

 D Compound identified in an analysis at a seconda
- J Analyte present, value may or may not be accura $\ensuremath{\mathsf{JD}}$ - Analyte present at a secondary dilution factor, ν
- U Not detected UD Analyte not detected at a secondary dilution far
- $\mu g/L$ micrograms per liter